

# **BEACH EROSION CONTROL REPORT FOR NORTH BEACH-TOWN OF HAMPTON AND FOSS BEACH-TOWN OF RYE, N.H.**

AUGUST 1977

REV. JAN. 1978

## SYLLABUS

This beach erosion control study has investigated the erosion, flooding and other allied storm damages which have occurred at North Beach in the town of Hampton and Foss Beach in the town of Rye, New Hampshire. The purpose of the study was to determine the economic, technical and environmental feasibility of providing improvement and protection measures at these two beach areas. The principal problem occurring at both of the study area beaches is one of gradual erosion and recession of the shoreline resulting in the loss of protective and recreational beach area and exposure of the backshore walls, roadways and structures to flooding and other associated storm damage.

At Foss Beach due to the rural residential nature of the area and the extensive amount of salt water marshland along the backshore, it was determined that the most acceptable method of providing protection would be the construction of a stone mound along the backshore of the beach for the entire 4,000 feet of the study area. However, it was found that this plan of protection did not meet the necessary economic criteria for Federal participation in an improvement project in which costs would be shared with local interests.

At North Beach four alternative plans of protection were evaluated. Three of the alternative plans involved the creation of an artificial barrier beach by the placement of sandfill with or without the use of stone groins. These plans while providing protection also afford additional beach area which can be used for healthful recreation by the populace. Both an offshore and a land based borrow site were investigated as potential sources for the required sandfill. A fourth plan involved the construction of a revetment structure in front of the existing steel sheet pile bulkhead and concrete seawall.

The recreational benefits associated with the first three plans were developed on the assumption that sufficient parking, access roads, bathhouses and sanitary facilities would be available to ensure that the beach would be utilized to its maximum capacity. If the potential offshore borrow site at the entrance to Newburyport Harbor in Massachusetts is utilized and all the recreational benefits can be fully realized all of the first three plans of protection show economic justification for Federal participation. However, at the present time this potential offshore source is not acceptable due to the existing moratorium on the mining of sand and gravel in Massachusetts territorial waters and the fact that the material will be utilized in another state.

Also to be considered are a number of physical and environmental constraints which have to be resolved before the necessary parking, access roads, bathhouses and sanitary facilities can be provided to ensure that the beach will be utilized to its full potential.

If a potential land based source of sand at Ossipee, New Hampshire is used the cost of the first three alternatives make them uneconomical for Federal participation. The fourth plan of protection involving the construction of a revetment structure was found not to be economically justified.

It is therefore recommended that no beach erosion control project be adopted by the United States for providing protection against erosion and storm damage along the two study area shorefronts. At Foss Beach this is due to the lack of economic justification. At North Beach it is caused by the major unresolved problems associated with providing an economically favorable beach erosion control project.

It is further recommended that if local interests are considering protective measures now or in the future, based on a determination of their economic and environmental justification, that they be accomplished in accordance with plans and methods considered in this report.

BEACH EROSION CONTROL  
 REPORT FOR  
 NORTH BEACH - TOWN OF HAMPTON  
 AND  
 FOSS BEACH - TOWN OF RYE  
 NEW HAMPSHIRE  
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*BEACH EROSION CONTROL REPORT FOR  
NORTH BEACH - TOWN OF HAMPTON  
AND  
FOSS BEACH - TOWN OF RYE, NEW HAMPSHIRE*

*THE STUDY AND REPORT*

The State of New Hampshire comprises a total area of over 9,300 square miles with about 18 miles of coastal shorefront, the majority of which is composed of ledge outcroppings, rocky headlands, pocket beaches and barrier beaches fronting salt water marsh areas. The beaches being studied in this report, namely, North Beach, in the town of Hampton and Foss Beach in the town of Rye, are of the barrier bar type. These beaches are continually exposed to the forces of nature such as winds, waves, currents and tidal action causing gradual erosion and resulting in the loss of recreational and protective beach area as well as damages to the backshore roadway and structures. The increasing demand for recreational salt water bathing areas and the development which has occurred along the backshore areas at North and Foss Beaches are adversely affected by this gradual erosion.

*Purpose and Authority*

As a result of the above mentioned problems and through the efforts of the Congressional delegates from the State of New Hampshire at the request of local and state interests, this report is being submitted in compliance with resolutions adopted 8 December 1969 and 2 December 1970 by the Committees on Public Works of the United

States Senate and House of Representatives, respectively. The resolutions read as follows:

"Resolved by the Committee on Public Works of the United States Senate, that in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army is hereby requested to cause to be made under the direction of the Chief of Engineers, a survey of the shores of the State of New Hampshire, at North Beach in the Town of Hampton and at Foss Beach in the Town of Rye and such adjacent shores as may be necessary in the interest of beach erosion control, hurricane protection, and related purposes."

"Resolved by the Committee on Public Works of the House of Representatives, United States, that, in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army is hereby requested to direct the Chief of Engineers, to make a survey of the shores of the State of New Hampshire at North Beach in the Town of Hampton and at Foss Beach in the Town of Rye and such adjacent shores as may be necessary in the interest of beach erosion control, hurricane protection, and related purposes."

The Chief of Engineers, by letter dated 19 February 1971, assigned to the Division Engineer, New England Division, a study to determine the economic, technical and environmental feasibility of providing erosion control protection and restoration measures at the two study area beaches.

### *Scope of Study*

This report deals with North Beach, Hampton and Foss Beach, Rye, located along the coastline of the State of New Hampshire as shown on Plate No. 1. Investigations were conducted to determine the best methods for protecting these areas against storm damages and the loss of recreational

beach area due to the erosion processes; the accompanying costs and benefits associated with these methods; and the allied impacts associated with them. (See Photos 1 & 2.)

### *Study Participants and Coordination*

The determination about providing beach erosion control improvement measures at North and Foss Beaches required close coordination between the Corps of Engineers, Federal, State and local officials and other interest groups. Coordination was first established by holding a public meeting in Eye on 22 June 1972 at which time the needs and desires of local interests were ascertained. As a result of this initial meeting a number of preliminary plans of improvement and protection were developed. A workshop meeting was held on 19 December 1975 in Concord, New Hampshire to present these preliminary plans of improvement to the Federal, State and local officials and interests, to discuss the problems and constraints associated with the plans, and to get their views and comments on the preliminary alternative plans in anticipation of conducting a mid-study stage public meeting. The written and verbal responses received at and subsequent to the workshop meeting indicated a relative lack of interest in the alternative plans. Furthermore, it was pointed out that a number of problems and constraints related to the considered plans would be difficult to resolve. This report includes the comments and views received from the State and local officials. Appendix B contains the pertinent correspondence exchanged among study participants during the study.

### *The Report*

In the interest of brevity and ease of reading, the contents of this report have been arranged into a main report and two appendices. The main report is a brief, nontechnical presentation describing

the results of the feasibility study for beach erosion control, hurricane protection and related purposes for the New Hampshire shoreline at North Beach and Foss Beach. Appendix A contains the detailed technical data associated with the information contained in the main report. Appendix B contains all the pertinent correspondence associated with the study.

### *Prior Studies and Reports*

The study area was included in "Beach Erosion Control Report on Cooperative Study of New Hampshire" dated 25 August 1960 and published in House Document 416, 87th Congress, 2nd Session. The report recommended that protective measures which may be undertaken by local interests based upon their determination of economic justification, be accomplished in accordance with methods proposed and projects developed in the report.

North Beach, Hampton - Placement of riprap revetment along the toe of approximately 2,000 feet of the steel bulkhead.

Foss Beach (South End), Rye - Construction of a steel sheet pile bulkhead approximately 200 feet long and placement of riprap revetment along its toe if needed.

Foss Beach (North End), Rye - Construction of a mortared stone wall approximately 1,150 feet long and placement of riprap revetment or a stone apron along its toe, if needed.

There are three authorized Federal beach erosion control projects along the New Hampshire coastline. The Hampton Beach project was authorized by the River and Harbor Act of 3 September 1954, modified by the River and Harbor Act of 23 October 1962, as amended by the Chief of Engineers on 14 June 1965. The project provides for Federal participation in the amount of one-third the first cost of widening to a general width of

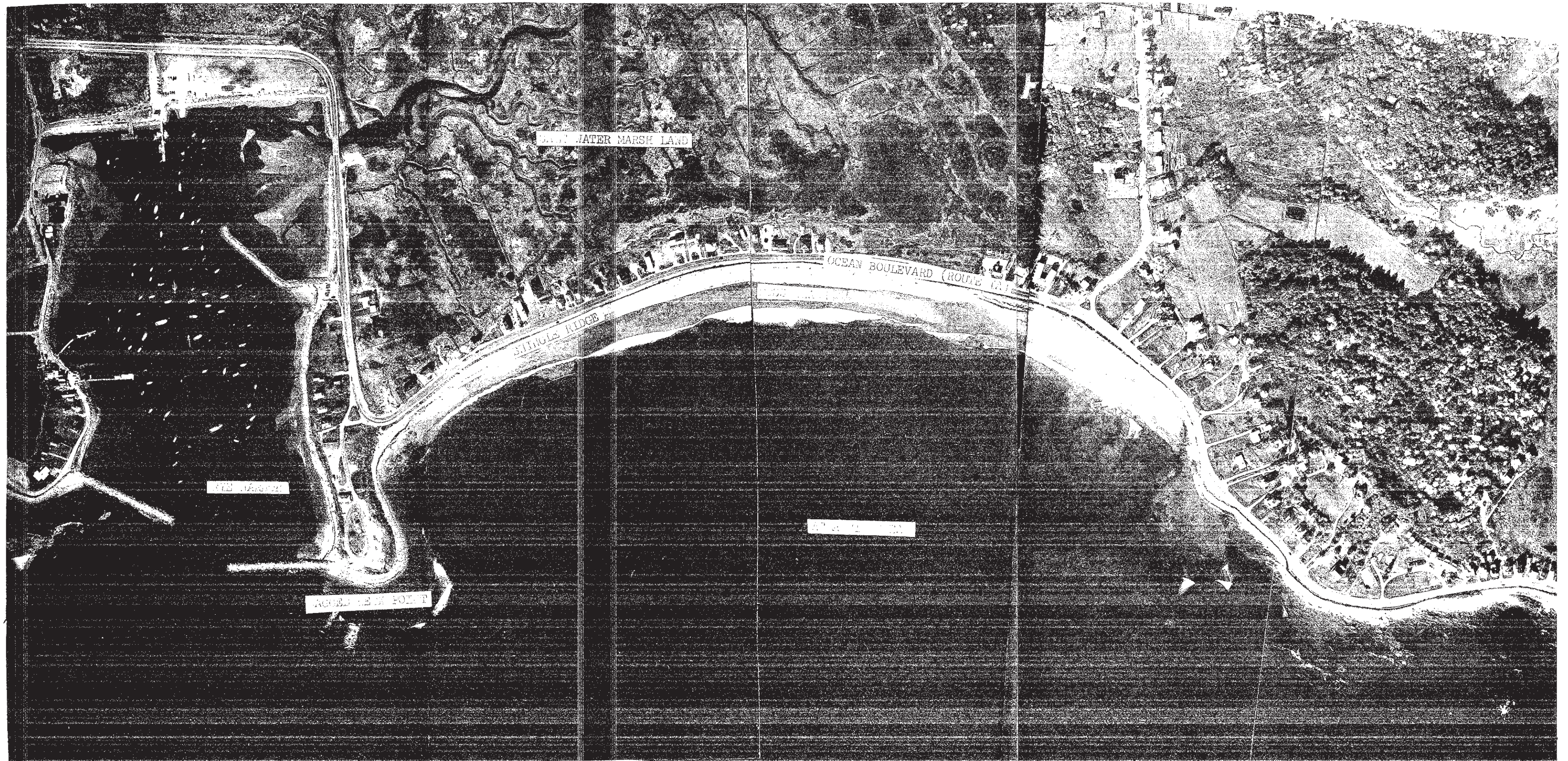


Photo 2. Aerial photograph of the Foss Beach area taken on October 11, 1976 at 10:08 E.D.T. Note the limited amount of backshore development and the extensive amount of salt water marsh land.

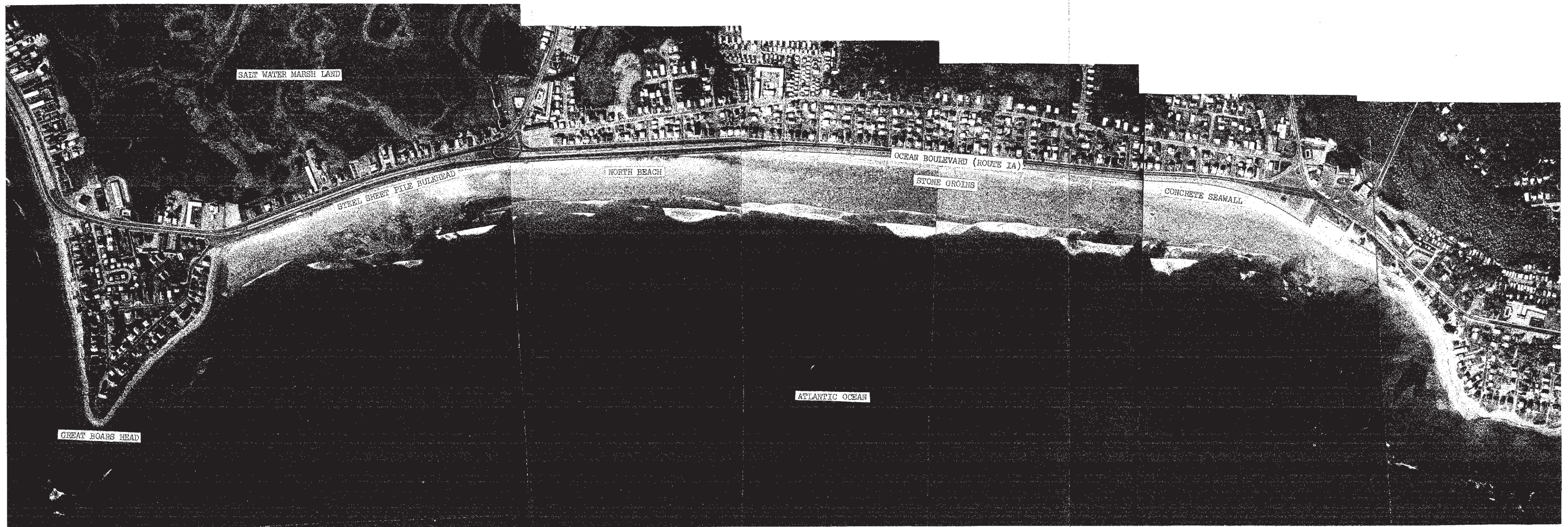


Photo 1. Aerial photograph of the North Beach area taken on September 9, 1976 at 10:14 E.D.T. showing the existing condition of the beach and the backshore development fronting the salt water marsh land.

150 feet by direct placement of sandfill approximately 5,200 linear feet of beach adjacent to and extending northward from Haverhill Street with an added widening along 1,250 feet of the northern end of the fill area. The Act of 1962, as amended in 1965, provides for Federal participation in the amount of one-half the first cost of construction of a groin 190 feet long extending from the vicinity of Church Street to an outcrop of rock offshore and for periodic nourishment of the beach for an initial period of 10 years. The project was completed in November 1965.

The existing beach erosion control project at Wallis Sands State Beach, Rye was adopted by the River and Harbor Act of 1962. It provides for Federal participation in the amount of 70 percent of the first cost of improving the public shore by widening approximately 800 linear feet of beach front to a 150 foot width by direct placement of sandfill and construction of an impermeable groin about 350 feet long. The project was completed by the State of New Hampshire in October 1963.

The North Hampton Beach project was authorized by the River and Harbor Act of 23 October 1962, as amended. It provides for Federal participation in the amount of one-half the first cost of improving the public shore by widening approximately 1,600 feet of beach to a 150-foot width by direct placement of suitable sandfill and construction of an impermeable groin about 350 feet long. No work has been done on this authorized project to date.

In view of severe hurricane damages experienced in the southern and eastern coastal areas of the United States, the 84th Congress on 17 June 1955 adopted Public Law No. 71 authorizing the study of means to prevent damages to property from hurricane tidal flooding. A report on this subject was completed for the New Hampshire Coastal

and Tidal Areas on 28 May 1964 and published as H.D. No. 294, 89th Congress, 1st Session. The report recommended that no hurricane protection improvements be undertaken in the coastal and tidal areas of New Hampshire by the United States at that time. The report was to serve as a guide to public and private interests in their long-range planning for the development of lands and other natural resources in the coastal area.

## *RESOURCES AND ECONOMY OF STUDY AREA*

In many instances, the natural resources of a region play a significant part in determining the economic and social well-being of the people. An understanding of these resources is helpful in identifying problems and needs. The Atlantic Ocean is the major water resource along the coastal areas of New Hampshire and as such has played the major role in shaping the economy and development in these areas. Most of this development along the coastline of New Hampshire is associated with the main economic activity, i.e. tourism. The permanent population in both Hampton and Rye has increased substantially over the past twenty years and it has been estimated that this trend will continue in the future. During the summer months, the population in these communities often doubles due to the recreational facilities available.

### *Natural Resources*

The shoreline of the State of New Hampshire is only about 18 miles in length. North and Foss Beaches have a combined length of about two and one-half miles, representing 14 percent of this total length. North Beach lies adjacent to and just north of the popular recreational area of Hampton Beach, in the town of Hampton, located within one and one-half hours drive of the densely populated urban area of Boston, Massachusetts and only a short drive from the metropolitan areas of

Concord and Manchester, New Hampshire. The area encourages water related recreational activities such as sunbathing, swimming, surfing, fishing, boating and picnicking. On peak weekends and holidays North Beach receives the overflow crowd from Hampton Beach. At the present time, North Beach is relatively narrow and made up of shingles along its southern half and fine to medium sand with a scattering of gravel and boulders along its northern half.

Foss Beach, in the town of Rye, lies adjacent to and just north of Rye Harbor. Like Hampton, the town of Rye is within a reasonable commuting distance of the urban area of Boston, Massachusetts and the metropolitan areas of Concord and Manchester; and the water resources of the Rye coastal area makes it an attractive place for bathing, surfing, boating, vacationing and picnicking. Wallis Sands State Park and Beach, which is located in Rye a short distance north of Foss Beach, is a popular recreational area. On peak days some of the people migrate south and utilize Foss Beach. Foss Beach primarily consists of a shingle ridge above high water except for some isolated patches of sand along the northern portion of the beach and sand below high water for the entire length of the beach.

Both of the state-owned beach areas are very valuable natural resources. At the present time, due to their physical condition, these areas are not being used to their full capacity. They are serving as ancillary facilities to other fully developed and popular beach areas along the New Hampshire shoreline.

### *Human Resources*

In 1970 the population of the state of New Hampshire was 738,000. Of this total, 209,362 persons or 28 percent were concentrated in the Great Bay area which is made up of Rockingham and Strafford Counties.

The towns of Hampton and Rye are included in Rockingham County.

In 1970 the population of the town of Hampton was 8,011. This represents a population increase of over 5,000 during the twenty-year period from 1950. With this dramatic increase in population, Hampton has become the ninth most densely populated community in the state. It has been estimated that the population of Hampton will continue to increase in the future, but at a reduced rate. During the summer months, Hampton's overnight population more than doubles and on a peak weekend or holiday crowds from 5 to 10 times the permanent population use the facilities and resources in the area.

The population of the town of Rye in 1970 was 4,083. This represents a sizeable increase in population of over 106 percent for the twenty-year period from 1950 to 1970. It has been estimated that the population of Rye will continue to grow at a very rapid rate for the fifty-year period from 1970 to 2020. The permanent population in Rye is projected to surpass that of Hampton by the year 2020. Like Hampton, the town of Rye is mainly a resort town whose economy is primarily based on tourists attracted to the area. Appendix A contains more detailed information on the human resources of the study areas.

### *Development and Economy*

The main economic activity along the coast of New Hampshire is tourism. A major portion of the residential and commercial development in the coastal communities is influenced by the salt water recreational activity in the area. The shoreline of the state is dotted with motels, restaurants, souvenir shops, amusement areas, marinas and boatyards. In general, the coastal area is open for business from May 15 to September 30 with the intensive business season ranging from July 1 to Labor Day. Of all the coastal towns, Hampton is the major center of

recreation and vacation activity. In addition to the commercial activity associated with the tourist trade, there is also a small amount of industrial activity in the area. This is reflected in the fact that according to the 1970 census, 49.1 percent of the housing units in Hampton were occupied year-round. At the present time, most of the recreational activity is centered around Hampton Beach which is fully developed and heavily commercialized. North Beach is not fully developed and has only two or three restaurants, one public sanitary facility, no bathhouses and a limited number of motels. Due to the relatively poor condition of the beach and the limited amount of concomitant facilities, North Beach usually only attracts overflow crowds from Hampton Beach and the local resident who wants to avoid the crowds at Hampton Beach. In addition, North Beach is at a disadvantage during peak weekend and holidays because large volumes of traffic approaching Hampton Beach from the south close off the access routes to North Beach.

The town of Rye is primarily a resort town with much of its economic base dependent on the tourists attracted to its beaches. There are a number of commercial establishments in Rye which service the tourist industry, but there is no manufacturing activity. Approximately 25 percent of the housing in Rye is seasonal in nature. The major publicly-owned beach area in Rye is located at Wallis Sands State Park. The beach area is fully developed and intensively utilized during the summer season. Privately owned beach areas along the Rye coastline are also heavily utilized and commercialized. However, unlike some of the other beach areas, Foss Beach is not extensively developed. It has no public bathhouses or comfort stations, only a limited amount of parking and only one or two restaurants located on the backshore. Because of the existing physical condition of the beach and lack of support facilities, Foss Beach is not a major recreation attraction in the area. Appendix A contains additional information regarding the economy and development in the study areas.

## PROBLEMS AND NEEDS

The problems and needs discussed in this report deal with damages that occur during severe storms and the loss of recreational beach area. This report discusses these issues and considers plans to alleviate the problems. The impacts of the plans and the way in which the plans address the desires of local interests are also dealt with.

### *Description*

The study area (Plate No. 1) consists of two widely separated public beaches located along the 18 miles of coastal shorefront in New Hampshire. North Beach is located about four miles north of the Massachusetts-New Hampshire border. It is separated from the popular recreation area of Hampton Beach by Great Boars Head, a high projecting glacial till headland forming the southern limit of North Beach. The shore of this headland consists of gravel, cobbles and boulders. The headland is protected by a continuous system of riprap revetment around the base of the steep bluff. The north end of North Beach is bounded by Plaice Cove.

North Beach is a coastal barrier bar approximately 1.7 miles long fronting a salt water marsh. This study deals with the first 7,800 feet of shoreline at North Beach beginning at Great Boars Head and extending northward as shown on Plate No. 2. Approximately one and one-half miles of the beach adjacent to Great Boars Head, including the study area, is owned by the State of New Hampshire and constitutes part of the Hampton Beach State Park. A state highway, Route 1A runs parallel to the shoreline and forms the backshore limits of the beach. Parking spaces are provided along this highway. The beach itself is narrow, consisting of shingles along its southern half and changes northward to fine and medium sand with a scattering of gravel and

boulders (See Photos 3 & 4). The sand and gravel continues northward to Plaice Cove and is interspersed with bedrock outcrops. A steel sheet pile bulkhead and concrete seawall have been constructed between the beach and the highway. The steel bulkhead has a top elevation of 21.0 feet above mean low water and extends northward from Great Boars Head for a distance of about 3,890 feet where it meets up with the south end of the curved face concrete seawall. A number of large armor stones were dumped in front of the steel bulkhead at the southern end to guard against undermining and washout (See Photo 5). The concrete seawall constructed with a top elevation of 22 feet above mean low water extends northward for a distance of approximately 3,815 feet (See Photo 6). A stone apron was placed at the toe of the wall and seven stone groins, each about 100 feet long, were built perpendicular to the wall and spaced about 400 feet apart. These groins were constructed with a top elevation of 17.0 feet at the wall, 15 feet at the seaward toe of the stone apron and 3 feet above the beach level at their outer end. They have experienced a considerable amount of damage. At the present time, the only visible portion of the groins consist of two layers of rectangular granite slabs stacked on top of each other. A number of these granite slabs have been displaced and the beach elevation is generally the same on both sides of the groins. (see Photo 7.)

Foss Beach is located about six miles north of North Beach. Ragged Neck Point, the site of Rye Harbor State Park, forms the southerly limit of Foss Beach. The point is a low narrow projection of land just north of Rye Harbor. The shore on the point is composed of gravel, cobbles, and boulders. Some of the park land was created from dredged material from Rye Harbor. Foss Beach is bounded on the north by Rye North Beach, whose shore is composed of gravel, cobbles and numerous bedrock outcrops. Foss Beach is a barrier bar fronting salt water marshland extending approximately 4,000 feet north from Ragged Neck Point as shown on Plate No. 3.

Foss Beach primarily consists of a shingle ridge above high water and sand below high water. Along the northern portion of the beach there are some sandy areas above mean high water in front of the shingle ridge. The backshore area of the beach is bounded by Route 1A, a State highway paralleling the entire coastline of New Hampshire. The beach lies within the highway right-of-way and, therefore, belongs to the State of New Hampshire. On the landward side of the highway at the edge of the marshland, there is a row of cottages, year-round residences and a couple of commercial establishments. On the seaward side of the highway there is an unpaved strip of land between the highway and the shingle ridge for parallel parking by people using the beach. (See Photos 8, 9, & 10.)

The New Hampshire State Highway Department constructed a dry masonry stone wall for a distance of approximately 535 feet along the central portion of the beach to protect the backshore roadway and structures against storm damage and flooding. The wall was built on top of the existing shingle ridge with the toe protected by riprap. Today, most of the wall is buried under the shingle ridge which forms a natural barrier along the backshore of the beach. Appendix A contains more detailed information about these two beaches and the protective structures associated with them.

### *Statement of the Problem*

The principal problem occurring at both of the beaches is one of gradual erosion and recession of the shoreline, resulting in the loss of protective and recreational beach area. The backshore walls, roadways and structures are exposed to flooding and other associated storm damage. This problem has necessitated the construction of costly protective works and increased the maintenance costs associated with the backshore facilities and structures.

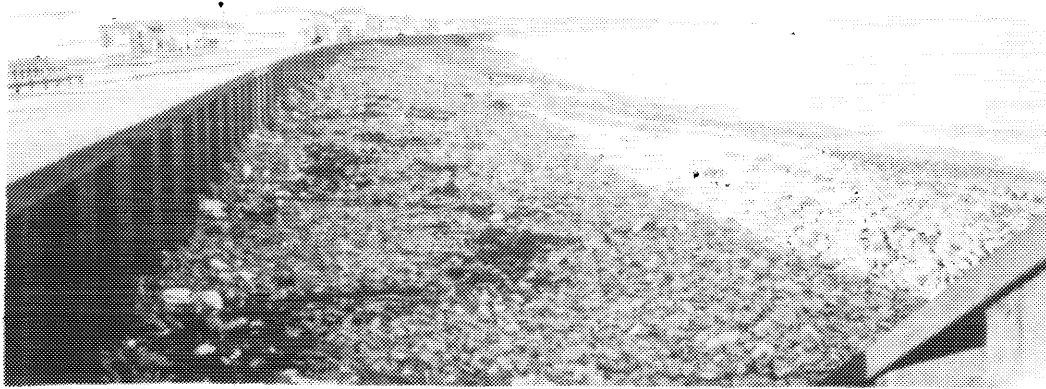


Photo 3. South end of North Beach looking north along steel sheet pile bulkhead. Note buildup of shingles and cobbles in front of bulkhead and narrowness of beach above high water line which allows damaging storm driven waves to break on and overtop the bulkhead.



Photo 4. North end of North Beach looking south. Note the narrowness of the beach above the mean high water line consisting of fine to medium sand and the damage and displacement which has occurred to the stone apron in front of the wall.

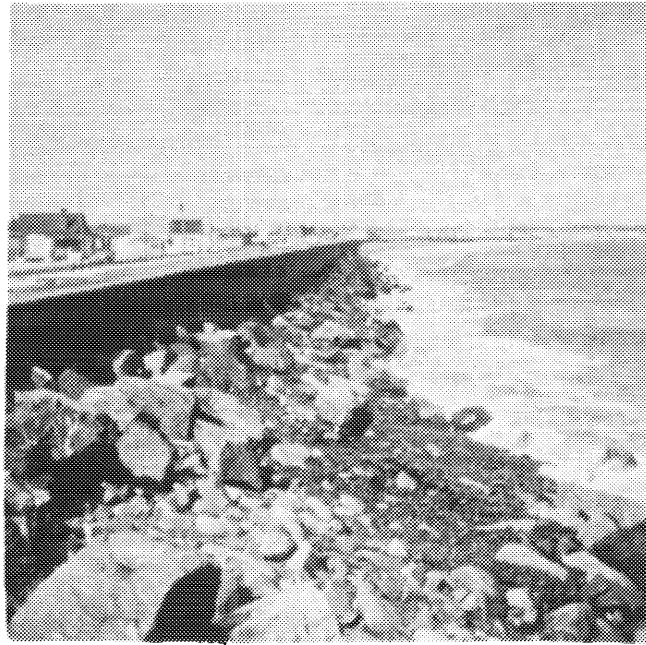


Photo 5. South end of North Beach. Note stone revetment which has been placed in front of the steel bulkhead to guard against undermining and washout.



Photo 6. Middle portion of North Beach looking north. Note the buildup of shingles in front of concrete seawall is just about level with top of access stairs and they often times spill over into sidewalk.



Photo 7. Looking north along central portion of North Beach. Note buildup of cobbles and shingles in front of wall covering stone apron, damaged condition of groin and narrowness of beach above high water level which limits its usefulness for recreational bathing.

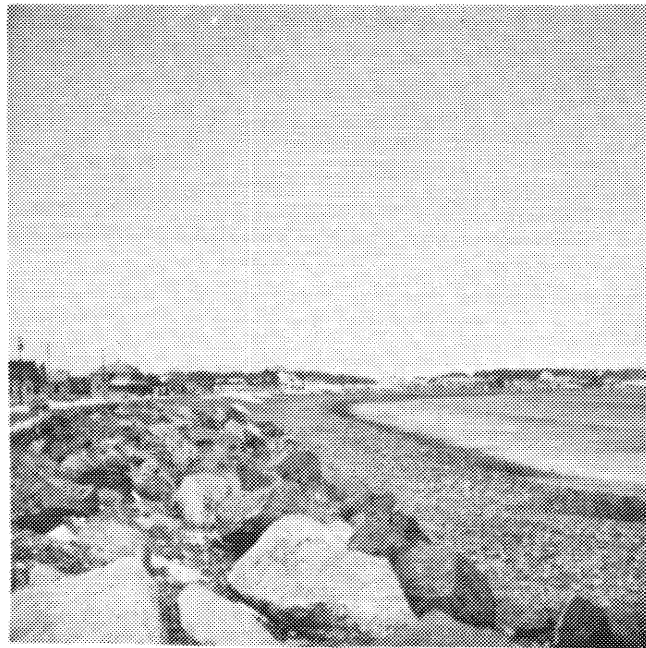


Photo 8. South end of Foss Beach. The shingle beach is very narrow above the mean high water line and some cover stone has been placed on the shingle ridge to guard against washout during storm conditions.



Photo 9. Looking south along Foss Beach. Narrowness of beach during normal high tides and rocky nature of beach greatly limits its usefulness for recreational bathing and exposes the backshore to damage from storm driven waves.

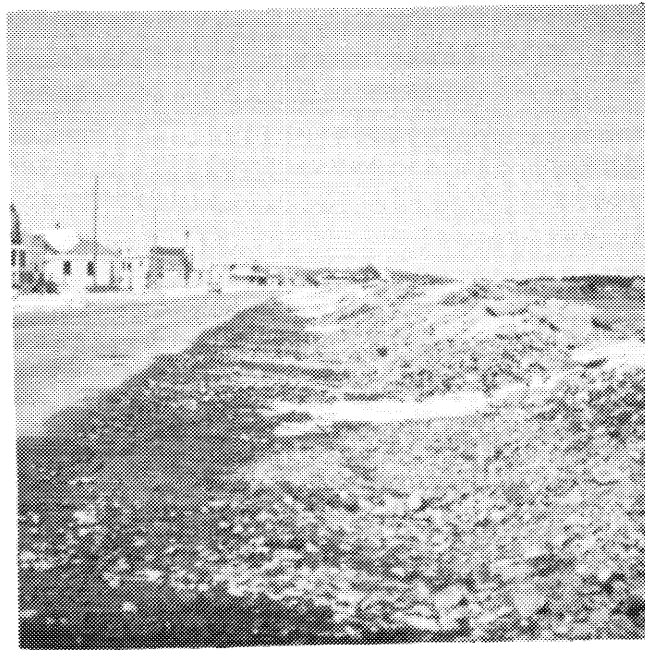


Photo 10. Looking north along Route 1A at backshore of Foss Beach. Storm waves wash stones, sand and debris onto strip of land used for parking and roadway. This material is periodically removed from roadway and push up to form the shingle ridge shown on right.

At North Beach, the narrow low beach permits storm waves to periodically overtop the seawalls. This results in flooding of the back-shore highway and structures and allows debris to be deposited in the area. At Foss Beach, the shingle ridge which runs along the backshore area, is periodically breached during severe storms. The shingle material is then washed across the highway causing the road to be closed. The backshore structures are also then exposed to flooding and allied damages. Highway and seawall structure repairs have been an annual expense to the state and private property owners have had to make repairs annually to correct damages incurred during severe coastal storms. The demand for salt water bathing areas is growing each year and additional beach areas are needed to handle the overflow crowds from the existing developed beach areas along the coast of New Hampshire.

### *Factors Pertinent to the Problem*

A number of factors and natural forces have helped shape both the North and Foss beach areas into what they are today. These factors and forces have been continually interacting to effect the changes which have occurred at these shoreline areas throughout the course of history. The following sections contain a discussion of these factors and forces.

### *Geomorphology*

The New England shoreline was submerged during the ice age. Following the melting of glaciers, limited emergence exposed headlands to eroding wave action. The eroded material was transported by ocean currents into indentations between the headlands and deposited, sealing off the entrances to the bays. The ponded water eventually filled with eroded materials from surrounding uplands and formed the

present day salt marshes. Barrier beaches interspersed with bedrock exposures comprise most of the shoreline from Cape Ann northward to Portland, Maine. All of these bedrocks are standing on end and strike parallel to the coastline. North Beach connects the glacial drift islands of Great Boars Head and Plaice Cove. Numerous rocks offshore indicate that part of the materials comprising the beaches of this area were derived from the erosion of other offshore glacial deposits.

### *Littoral Materials*

Characteristics - A number of surface samples of beach and nearshore materials were obtained on eight beach profiles spaced throughout the study area. At North Beach samples were taken along Profiles 2, 4, 6 and 8 at the toe of the wall, on the beach berm, at mean tide, at mean low water and offshore at the 6, 12 and 18-foot depth contour. The profile locations are shown on Plate No. 2. The North Beach samples indicated that the littoral material from mean low water (mlw) to the 18-foot depth contour consisted mainly of coarse to fine sand. Above mean low water to the toe of the wall, the materials ranged from coarse sand to coarse gravel and cobbles along the southerly half of the beach changing to fine to coarse sand at the northern end.

At Foss Beach samples were taken along profiles 2,3,4 and 5 at the back of the beach berm, at mean sea level (msl), at mlw and offshore at the 6,12 and 18-foot depth contour. The profile locations are shown on Plate No. 3. At Foss Beach littoral material from mlw to the 18-foot depth contour was composed mainly of coarse to fine sand. Above mlw to the back of the beach berm, the materials ranged from coarse sand to coarse gravel and cobbles along the entire shore. Glacial deposits have constituted the principal source of beach materials. Materials from headlands at Great Boars Head, Plaice Cove, Ragged Neck Point and Concord Point, transported by littoral currents as littoral drift, have

contributed to the formation of North and Foss Beaches. All of these sources are protected against erosion by manmade protective structures or have now been stripped of their overburden materials. As a result, there are no sources which can contribute an appreciable amount of littoral drift in the area to help nourish and maintain these beaches.

### *Littoral Forces*

a. Waves— Waves generated by easterly winds approach the New Hampshire coast from the Atlantic Ocean and the Gulf of Maine. The fetch distance across the Gulf of Maine to the northeast is limited to about 250 miles by Nova Scotia. The Isles of Shoals, located about 7 miles offshore, afford a minor amount of protection from large ocean waves. Short period waves and long period swells from the east and southeast are modified and deflected by numerous shoals on the continental shelf. Cape Ann, 18 and 23 miles south of the study areas, affords protection against waves generated by southerly winds. No wave measurements are available in the immediate area. A wave rose diagram covering the three year period from 1948-1950 for a deep water location off Penobscot Bay, Maine, is shown on Plate No. 1. It indicates that waves of the greatest duration and height occur from the east and east northeast.

b. Currents - Tidal currents along the coast of New Hampshire flood to the north and ebb to the south. Tidal currents flood into and ebb out of Rye Harbor. According to the 1976 Tidal Current Tables, published by the National Ocean Survey, maximum currents at Gunboat Shoal 2.5 miles off the coast of Rye, New Hampshire, have an average flood and ebb velocity of 0.5 knots.

c. Winds - Records of wind observations made by the U.S. Weather Bureau at Boston, Massachusetts and Portland, Maine for the ten-

year period 1949 to 1958 inclusive, show that prevailing winds blow offshore from westerly directions and winds which blow onshore prevail from the northeast quadrant over those from the southeast quadrant. Wind diagrams for both the Boston and Portland area covering the period from 1949 to 1958 are shown on Plate No. 1. These diagrams show there is little difference in duration of the prevailing winds between the northwest and southwest quadrants. The majority of prevailing winds blow at speeds between 8 and 24 miles per hour for the longest duration. Winds from easterly directions occurring about one-third of the time generate waves that affect the New Hampshire coast. The duration of the easterly winds is greatest from the northeast quadrant. Assuming that winds along the New Hampshire coast are similar to those at the nearest weather station in Boston, it appears that the most severe gales which occur in this area approach onshore from the northeast quadrant. Winds of smaller intensity predominantly blow offshore from the northwest and southwest quadrants.

d. Storms - A summary of storms which occurred during the period from 1870 to 1945 was compiled from records of the United States Weather Bureau at Boston, Massachusetts. During this period there was a total of 160 storms representing major disturbances accompanied by high wind speeds of long duration. Of this total, 50 percent of the winds approached from the northeast direction. The storms were accompanied by rain or snow, strong winds and extreme high tides. These storms cause shore inundation, the battering of seawalls by wave attack and washing and blowing of debris and sand onto coastal roads resulting in flood damages to low-lying shore developments.

e. Tides - Tides are semi-diurnal. The mean range is 8.5 feet and the spring range is 9.8 feet. Tidal observations have been made at various locations and times to determine the frequency of tides above the plane of mean high water. It was found that tides exceed the plane of mean high water by one foot or more on an average of 107 times, annually,

by 2 feet or more 12 times; by 3 feet or more, 0.45 times; and by 3.5 feet or more, 0.17 times. The highest tides of record were approximately 3.9 feet above mean high water occurring in the northeast storms of 30 November 1944 and 29 December 1959. Nearly the same level of flooding was experienced in the storm of 20 January 1961. The highest stage of tide experienced in a hurricane was approximately 3.2 feet above mean high water during hurricane "Carol" on 31 August 1954. The flood levels in New Hampshire from the hurricanes of 1938 and 1944 were 2.0 and 0.9 feet above mean high water, respectively, or less than the stage in an annual high spring tide.

### *Shore History*

a. Shoreline and Offshore Changes - Changes occurring along the New Hampshire coast are not large or rapid. Seaward movement of the shoreline at the south end of North Beach for the period 1953-1976 is principally due to construction of protective structures seaward of the former shoreline. Shoreline comparisons along the rest of the shore in the study area indicate that in recent years, changes have been small and have varied for different periods from erosion to accretion with no definite trends. Shoreline and offshore depth changes have been recorded on at least six different occasions during the past hundred years and are shown on Plates 6 and 7.

At North Beach the shoreline changes which have periodically occurred from 1866 to 1973 due to erosion or accretion have been in the order of fifty to seventy-five feet. Most of these changes were found to occur prior to 1953. During the same time period the offshore six-foot depth contour experienced a general seaward movement and the 12 and 18 foot depth contours a landward movement. The offshore depth contours have not experienced a large amount of change since 1954.

Records of shoreline changes at Foss Beach from 1866 to 1973 show a range of up to 100 feet or more on an intermittent basis due to erosion or accretion. From 1959 to 1973, the shoreline has remained fairly stable. During this same period the 6, 12 and 18-foot contours have experienced an irregular landward and seaward movement with a predominance in the seaward direction.

b. Prior Corrective Action and Existing Structures - Protective works have been constructed to prevent erosion and destruction to the backshore property along both beaches. In 1955-1956, the State of New Hampshire constructed approximately 3,900 feet of steel sheet pile bulkhead at North Beach starting at Great Boars Head on the seaward side of Ocean Boulevard and extending north. The northerly end of the bulkhead terminated at the south end of the existing concrete seawall. The sheet pile bulkhead has a top elevation of 21.0 feet above mean low water. Access to the beach is provided through the north flanks of four bastions which project about 9 feet seaward of the bulkhead line. This bulkhead replaced a shingle riprap ridge which was leveled to facilitate a highway improvement project. Riprap revetment has been placed along the seaward toe of the structure to prevent undermining. The wall is overtopped by waves during high stages of tide accompanying severe storms, particularly along the portion adjacent to Great Boars Head. North of the steel sheet pile bulkhead is a curved face concrete gravity seawall which was constructed by the State in 1933-34. It extends along the seaward side of Ocean Boulevard for a distance of 3,815 feet and was constructed to a top elevation of 22 feet. A stone apron has been placed along the toe of the wall throughout its length. Access to the beach is provided by steps through both flanks of eight bastions which project about 7.5 feet from the wall. The wall has provided adequate protection, although it has been overtopped on rare occasions. Seven stone groins, each 100 feet long, were built perpendicular to the wall and spaced about 400 feet apart. These groins have experienced considerable damage and are

badly in need of rehabilitation due to settlement and displacement.

At Foss Beach, the New Hampshire State Highway Department has constructed and maintained a 535-foot long dry stone wall along the central portion of the beach. The wall was built on top of an existing shingle beach mound. Following destructive storms, repairs have been made to the wall and the seaward side has been protected by riprap. At the present time, this wall is almost completely buried under the shingle ridge that runs along the entire back of the beach. This ridge forms a natural barrier which provides some protection to the backshore roadway and structures during storm conditions.

c. Profiles - Beach profiles were surveyed at nine selected points along North Beach and seven locations at Foss Beach. These profiles extended from the backshore out to the 18-foot depth contour. Plots of these profiles are shown on Plates 4 and 5 and their locations on Plates 2 and 3. These profiles were compared, when possible, with other profiles taken during previous studies to determine if there was any dramatic change in the beach conditions. Results of these comparisons indicate that both beaches are relatively stable and the small volumetric changes that occur due to erosion or accretion are seasonal in nature.

### *Improvements Desired*

The needs and views of local interests concerning protection and improvement of the study areas were obtained through a public meeting held in Rye, New Hampshire, on 22 June 1972. The meeting was attended by 82 people, including State and town officials. Some local interests were of the opinion that a wide sandy beach should be artificially placed seaward of the existing backshore structures to cover the shingle beach. The sandfill would provide needed recreational bathing

space and would prevent all but the highest storm waves from reaching the protective structures. They did not favor increasing the height of existing structures to almost completely prevent overtopping, due to the loss of the attractive scenic view which is an asset to the areas. Many were in favor of maintaining existing structures only. In summary, they were desirous of obtaining additional protection from storm damage and more recreational beach area, but they did not want to have any major change occur which would affect the character of these beach areas.

## *PLAN FORMULATION*

The erosion and storm damages sustained in the study areas during intense winter storms and the likelihood that the areas will continue to experience such destructive events points out the need for developing plans of protection to guard against future occurrences. In addition, the need to provide additional salt water bathing areas to provide for the healthful recreation of the populace needs to be addressed. A plan is needed which addresses the need for recreational beach areas, insures an adequate degree of protection, provides for maximization of net benefits and at the same time minimizes possible adverse environmental impacts. Alternative plans aimed at meeting these requirements were considered.

### *Formulation and Evaluation Criteria*

The formulation and evaluation of a plan involves the screen of alternative plans which best meet the appropriate set of formulation and evaluation criteria. Such a set of criteria should include technical, economic, environmental and other pertinent tangible and intangible considerations which will lead to the development and selection of a plan that best responds to the problems and needs. The following discussion describes the technical, economic and environmental criteria which were used in plan formulation.

## *Technical Criteria*

Proposed protective measures are designed to provide protection against storm conditions of comparatively frequent occurrence, such as storms that occur on an average of once per year. They are not intended to provide complete protection in the event of hurricanes or great magnitude storms of infrequent occurrence, although even under these conditions some protection will be afforded.

- a. Design Tide - The design tide used is 12.0 feet above the plane of mean low water. This is a little higher than the highest tide expected to occur on an average of once a year.
- b. Design Waves - The height of the design wave was determined from the relationship  $d/h=1.28$ , where  $d$  is the depth at breaking and  $h$  is the height of the wave at breaking, using the depth at, or a short distance seaward of, the proposed structure as the depth at breaking.
- c. Sizes and Slopes of Armor Stones in Structures - Sizes and slopes of armor stone for revetments and groins were computed using the stability formulas for armor stone described in the Shore Protection Manual compiled by the U.S. Army Coastal Engineering Research Center.
- d. Sandfills - The berm elevation of proposed sandfills is based on those at existing beaches in the study area. This elevation was determined to be 16.0 feet above mean low water. The minimum width of fill above mean high water is based on widths found to afford protection against storms of the design magnitude. Estimated volumes of fill are based on slopes similar to existing slopes, but fill can be placed initially to a steeper slope and permitted to assume a more natural slope by wave action.

## *Economic Criteria*

- a. Tangible benefits exceed project costs.
- b. Each separate unit of improvement provides benefits at least equal to its cost.
- c. The scope of the plan is to provide maximization of net benefits.

The benefits and costs have been expressed in comparable quantitative economic terms whenever possible.

## *Environmental and Other Considerations*

- a. Public health, safety and social well-being.
- b. Provisions for pleasing aesthetics and other desirable effects or features.
- c. Avoidance of detrimental environmental effects to the maximum extent possible.

## *Possible Solutions*

There are several beach erosion control protective and/or preventative measures which have proven to be effective in reducing storm damages and erosion. These include offshore breakwaters, rock revetment, stone mounds, seawalls, bulkheads, groins, sandfill and a combination of stone groins and sandfill. After applying the plan formulation and evaluation criteria to the various protective measures, a number of alternative plans of protection were developed utilizing one or more of the following measures: rock revetment, sandfill and sandfill in conjunction with groins for the North and Foss Beach areas. The following section contains a description of the considered plans of protection that were developed for the beach areas. A discussion of the economics and impacts associated with these plans is included later in this report, as well as in Appendix A.

## *Considered Plans*

The damages which are now being experienced at Foss Beach and the backshore area during severe coastal storms, for the most part, result from the low elevation and narrowness of the beach. A wider and higher beach would cause the impinging storm waves to break farther offshore, thus reducing the damages to the backshore highway and structures. Wave energy is known to be high in the Foss Beach area indicating that it would be difficult to maintain an artificially placed sandfill beach without a large amount of annual nourishment at a substantial cost. In most instances, in order to economically justify an artificially created protective barrier beach by placement of suitable sandfill, a large amount of recreational benefits also have to be realized by the project. Unfortunately, there are a number of constraints in the Foss Beach area dictating against deriving a large amount of recreational benefits. A list of the major constraints is as follows:

- . Insufficient existing parking and lack of satisfactory areas to provide additional parking. (This is pointed out by the fact that the land behind the structures located on the landward side of the highway is all saltwater marshland.)
- . No existing sanitary or bathhouse facilities.
- . Limited road access to the beach.
- . No public transportation in the area.
- . Minimal number of private residences and commercial hotels and motels in the area, limiting the number of walkers who can utilize the area.

Based on the above facts, it was determined that a sandfill beach project at Foss Beach could not be economically justified. Attention was given to developing a less expensive plan of protection for Foss Beach. The plan involved the construction of a stone mound by placement of dumped riprap on the existing shingle beach ridge. The top elevation of the stone mound should be at a height of 19 feet above mean low water to prevent damaging wave overtopping and the

bottom of the structure should be properly toed in to prevent undermining. The stone mound would require considerably less maintenance than sandfill. A suitable cross section for the stone mound should have a top width of five feet with slopes approximately one vertical to 1.5 horizontal. Individual stone sizes should range from 0.75 to 4 tons with approximately 60 percent of the stone ranging between 2 and 3 tons each. The larger stones would be placed on the outside of the structure. Dumped riprap on the seaward face is preferable to placement of individual stones to provide a rougher surface for reduction of wave energy. A typical section showing what this stone mound would look like is shown on Plate No. 3.

North Beach is narrower, on the average, than Foss Beach above the mean high waterline. As a result, the present protective works are overtopped by storm wave action more frequently. The backshore area is more highly developed than at Foss Beach and the beach is subjected to a large recreational demand when Hampton Beach is overcrowded. Four alternative plans of protection were developed for North Beach to improve present conditions relative to providing protection and increasing recreational facilities.

PLAN I - This plan involves the placement of sandfill along 7,200 feet of the northerly portion of the study area to an elevation of 16 feet above the plane of mean low water (mlw) and the construction of two terminal groins, one at the northerly limit of the study area and the other approximately 600 feet north of the southern limit of the study area. Various beach berm widths ranging from 50 to 125 feet with a beach face slope of one vertical to 20 horizontal were investigated for this plan. The 50-foot wide berm was considered to be the minimum beach width required to furnish adequate protection. The incremental widths of 75, 100 and 125 feet respectively were included in the study to determine whether a wider beach, which would provide additional

protection, could be economically justified by also providing for additional recreational needs. The existing armor stone along the first 600 feet at the southerly end of the beach would be reset and maintained to provide maximum protection to the existing steel sheet pile bulkhead in this area. The existing armor stone located further north along the face of the wall would be relocated to strengthen the armor stone protection at the southern end.

PLAN II - This plan would involve the placement of sandfill without terminal groins along the entire 7,800 feet of the study area to an elevation of 16 feet above mlw. Various beach berm widths ranging from 50 feet to 125 feet were also investigated under the plan.

PLAN III - This plan is the same as Plan I with the addition of a series of eight low profile intermediate groins located at 800-foot intervals between the two terminal groins. These low profile groins will allow the sand to pass over the top to prevent starving of the downdrift side of the groins. They will also reduce erosion during periods when waves attack the beach at an oblique angle, thus reducing the amount of periodic nourishment required.

PLAN IV - This plan involves the placement of rock revetment along the entire 7,800 feet of beach in front of the sheet pile bulkhead and concrete wall to reduce overtopping and prevent erosion at the toe of these structures. The revetment would have a top elevation of 12.0 feet above mlw, a top width of 12.5 feet and a slope of 1.5 feet horizontal to 1.0 vertical. The revetment is considered to be the minimum protection required to reduce overtopping and erosion from all but the most severe storms.

All of the plans mentioned for North Beach provide protection against erosion and storm damage caused by waves breaking directly on and overtopping the steel sheet pile bulkhead and concrete seawall. The first three plans provide for more, much needed, recreational

beach area to accommodate the increasing demand. The width of the sand berm for these three plans that should be used must be determined on the basis of the degree of protection desired, recreational demand and the initial cost with the associated maintenance costs. Plate No. 2 shows typical sections for the various considered plans of protection for North Beach.

### *Effects on the Environment*

The considered plans of protection and improvement will have both good and bad impacts on the environment. If no measures are taken to provide protection against gradual erosion occurring along the study area shorefronts, these areas will continue to change as the physical forces dictate. Some impacts of the considered plans on the study areas are included in the following paragraphs.

### *Without Improvements*

If none of the considered plans are implemented at North Beach, the area will continue to flux as the physical forces dictate. Erosion and deposition will continue to change the contour of the shoreline. The steel sheet pile bulkhead and concrete seawall will continue to be periodically exposed to storm driven attack and overtopping, resulting in flooding and allied damages to the backshore highway and structures, and damage to and potential undermining of the structures themselves. These occurrences will necessitate costly repairs and cause disruption of vehicle traffic in the area. As the shoreline continues to undergo changes, the plants and the animals in the area will continue to change in order to adapt to the changes in the ecosystem. In general, there will be no beneficial or adverse effect on the benthic organisms. As erosion or accretion occurs, they will adapt to changing sediment conditions with populations remaining at the existing level. The fish communities in the area will be mini-

mally impacted while populations will remain stable. However, some communities may be displaced due to the movement of material in the area. No major beneficial or adverse impacts will occur in the marine ecosystem if a project is not undertaken. The biological, chemical and physical conditions will change in response to the dictates of nature. A similar situation exists at Foss Beach. If no protection measure is undertaken, the backshore highway and development will continue to experience damage during severe storm conditions when waves overtop and breach the shingle ridge located behind the beach area. The potential losses that may occur at Foss Beach are somewhat less than those at North Beach due to the fact that the Foss Beach area is not as developed. The changes which may occur in the marine ecosystem would be similar to those which might be expected to occur through natural processes.

### *With Improvements*

All of the considered plans developed for North Beach will provide adequate protection against extensive damage to the bulkhead, sea wall and the other backshore facilities for all but the most severe storms. The protection afforded by these protection measures will enhance the social well-being and property values in the area. In addition, Plans I, II and III provided for additional recreation beach area. Fishing facilities will be provided once the groins or rock revetment have been constructed as indicated in Plans I, III and IV.

The impacts of the proposed plans on the ecosystem in the immediate study area will depend largely on the magnitude of the protection project. All of the plans will reduce the area that the present biological community inhabits. The benthic community will be the most adversely impacted. There may be a change in the current patterns, and this in turn could affect the feeding ability of those attached organisms dependent upon these currents. However, not all impacts would

be adverse. Almost any surface placed in coastal water will quickly develop an association of plants, animals and bacteria. The groins and revetment structures which were considered, as or in conjunction with other measures, should develop a luxurious growth of fouling communities that increases each summer and die back during the winter. The species comprising this growth differ with the area and time of year, but generally the community should be comprised of the following: mussels, barnacles, amphipods, polychaetes, gastropods, crabs and algae. These organisms will attract other forms of life to feed on and hide within them.

There will also be some short term impacts during the construction period. An increase in turbidity can be expected in the immediate project area, as well as the adjacent areas during placement of the sandfill and construction of the rock structures. This will mean many organisms will leave the area or die due to these activities. However, these areas should recolonize shortly after construction activities cease. An increase in noise and air pollution may also be expected to occur during the construction period.

Rock structures such as groins and revetment are sometimes viewed as being detrimental to the aesthetics of an area. But, if properly designed, built and maintained they may enhance the aesthetics of an area.

Both offshore and land based borrow sites were investigated as potential sources of sandfill material. The costs and environmental impacts associated with a land-based borrow site versus an offshore source are significant. A final determination has not been made as to which borrow site would be best for this study. Additional information is required regarding a number of items and issues which have to be resolved before a final determination can be made as to which

borrow site to use. A discussion concerning these items and issues is contained in later sections of this report. A detailed evaluation of the impacts associated with the borrow site would be made at the time of site selection.

Construction of a stone mound at Foss Beach would cause similar long and short term impacts as those associated with the revetment structure at North Beach. The stone mound would block the scenic view of the ocean from the roadway and limit access to the beach. However, the existing shingle ridge along the backshore of the beach already poses similar obstructions.

## *ECONOMIC ANALYSIS*

This section of the report deals with the economics associated with the various improvement plans which were discussed earlier. A discussion of the costs, benefits and economic justification of the plans is included. A more detailed breakdown and discussion of the estimated costs, annual charges and benefits is included in Appendix A.

### *General*

In order to establish the economic justification of the improvement plans, a comparison has to be made between the equivalent average annual charges (i.e. interest, amortization, and maintenance costs) with an estimate of the equivalent average annual benefits, which would be realized over the 50-year study life. Appropriate values given to costs and benefits at their time of accrual are made comparable, by conversion, to an equivalent time basis using an appropriate interest rate. Cost estimates are based on prevailing 1977 price levels and a directed interest rate of 6 3/8 percent applicable to public works projects.

### *First Cost*

Both a land based and an offshore borrow site were evaluated as a potential source for the sandfill required for the first three plans of improvement developed for the North Beach area.

During the initial investigation, based on existing available information, it was felt that a suitable quantity and quality of sandfill could be obtained from offshore deposits at Salisbury Beach and at the entrance to Newburyport Harbor in Massachusetts. Cost figures were developed assuming these sites would be utilized as the sand source. It was further assumed that the method used for getting the material to North Beach would involve the dredging and placement of the sand material in a barge at the borrow site, then towing the barge for a distance of 10 miles to the project site and transferring the sand by pumpout facilities directly to the beach. Table I reflects the estimated first cost of the various considered plan of improvement for North Beach based on obtaining the required sandfill from the offshore area near the entrance of Newburyport Harbor. The table also reflects the fact that the rock revetment and stone required for the groins would be obtained from inland quarries. These estimates include the cost of materials, contingencies, engineering, design, supervision and administration charges.

However, at the present time, the Commonwealth of Massachusetts has declared a moratorium on the mining of sand and gravel in their territorial waters. In addition, from a technical standpoint, a detailed investigation would have to be conducted to determine if removal of sand from the offshore bar would adversely affect the shoreline at Plum Island and Salisbury Beach before any dredging was performed. If the investigation showed that those shoreline areas would be adversely affected, this source would not be suitable for use in this project. Also, the open exposure of both the potential borrow site and the project site may cause problems during dredging and pumpout oper-

TABLE I  
ESTIMATED FIRST COST OF IMPROVEMENTS  
FOR NORTH BEACH

<u>Plan No.</u>	<u>Description</u>	<u>First Cost*</u>
I A	7200' of sandfill, terminal groins and 50' berm width.	\$3,367,600
I B	7200' of sandfill, terminal groins and 75' berm width.	3,929,600
I C	7200' of sandfill, terminal groins and 100' berm width.	4,617,600
I D	7200' of sandfill, terminal groins and 125' berm width.	5,196,200
II A	7800' of sandfill with a 50' berm width.	3,157,400
II B	7800' of sandfill with a 75' berm width.	3,669,800
II C	7800' of sandfill with a 100' berm width.	4,341,000
II D	7800' of sandfill with a 125' berm width.	4,949,600
III A	7200' of sandfill, terminal and intermediate groins and 50' berm width.	5,708,000
III B	7200' of sandfill, terminal and intermediate groins and 75' berm width.	6,404,200
III C	7200' of sandfill, terminal and intermediate groins and 100' berm width.	7,283,800
III D	7200' of sandfill, terminal and intermediate groins and 125' berm width.	8,058,000
IV	7800' of rock revetment.	2,531,000

\* The cost shown for Plans I, II, and III are based on obtaining the sandfill offshore of Newburyport Harbor, Massachusetts.

ations. Additional measures may have to be taken during these operations which will lead to an increase in cost.

Based on the above considerations further investigations were conducted to locate other potential offshore sandfill borrow sites in New Hampshire waters. In 1972 a commercial sand and gravel mining company applied for a permit from the State of New Hampshire to dredge approximately five million cubic yards of sand and gravel offshore, in the area between Great Boars Head and Plaice Cove. The actual area was about 1.2 miles wide by 3.2 miles long, located between 0.2 to 2.0 miles from shore in water depths averaging 60 feet below mean low water. No official action was taken by the State because the company withdrew the application. Apparently the permit application was withdrawn in response to a resolution passed by the State Legislature limiting the mining of sand and gravel in the territorial waters of the State of New Hampshire to one hundred thousand cubic yards, as well as, the opposition being voiced by the citizens of Hampton and conservationists throughout the state who feared this dredging proposal would damage the multi-million dollar Hampton Beach area by shifting beach sand and disrupting the marine plant and fish life in the area. Based on these facts it was felt that this potential borrow site would not be looked on favorably by State and local officials. In addition, since this material is located in depths of water averaging 60 feet below mean low water and most dredging equipment readily available cannot reach borrow sources in water deeper than 60 feet, the cost of dredging and handling may increase significantly over that for dredging in shallower water. At the present time, there does not appear to be any other suitable borrow sites with the required quantity and quality of sandfill in New Hampshire territorial waters.

During the course of the study potential land based sources of suitable sandfill were investigated. The closest land based borrow pit containing quantities of the magnitude and grain size required for the projects is located in Ossipee, New Hampshire. It was assumed that

the method used to get the material to the project site would involve transportation by rail to within 20 miles of the coast, unloading, stockpiling and then reloading and hauling to the beach by truck. The cost involved in this method was more than twice the cost of obtaining the material from an offshore source. Table II reflects the estimated first cost of the various considered plan of improvement for North Beach based on obtaining the required sandfill from the land based source at Ossipee, New Hampshire.

At Foss Beach only one plan of improvement was developed to provide protection to the backshore highway and structures. The constraints for the Foss Beach area dictated against developing a sandfill improvement plan. The plan which was developed involved the construction of a stone mound along the back beach area for the entire 4,000 feet of the study area. The estimated first cost of this plan of protection for Foss Beach was found to be \$604,300.

### *Annual Charges*

All of the estimated annual charges have been computed at a directed interest rate of 6-3/8%, assuming a useful project life of 50 years. Maintenance estimates which are included in the annual charges for sandfill have been based on the maximum rate of loss determined from past shore recession. It has been assumed that the proposed groins could reduce the rate of loss of sandfill by about 50 percent. Table III gives the estimated annual charges for the considered plans of improvement at North and Foss beaches. For Plans I, II and III shown on Table III for North Beach the tables gives the estimated first cost for obtaining the required sandfill from both a land based or an offshore borrow site.

TABLE II  
ESTIMATED FIRST COST OF IMPROVEMENTS  
FOR NORTH BEACH

<u>PLAN NO.</u>	<u>DESCRIPTION</u>	<u>FIRST COST*</u>
I A	7200' of Sandfill, Terminal Groins and 50' Berm Width	\$7,693,800
I B	7200' of Sandfill, Terminal Groins and 75' Berm Width	8,930,000
I C	7200' of Sandfill, Terminal Groins and 100' Berm Width	10,798,200
I D	7200' of Sandfill, Terminal Groins and 125' Berm Width	12,350,000
II A	7800' of Sandfill with a 50' Berm Width	7,922,200
II B	7800' of Sandfill with a 75' Berm Width	9,292,400
II C	7800' of Sandfill with a 100' Berm Width	11,162,800
II D	7800' of Sandfill with a 125' Berm Width	12,806,800
III A	7200' of Sandfill, Terminal and Intermediate Groins and 50' Berm Width	10,019,800
III B	7200' of Sandfill, Terminal and Intermediate Groins and 75' Berm Width	11,490,200
III C	7200' of Sandfill, Terminal and Intermediate Groins and 100' Berm Width	13,450,000
III D	7200' of Sandfill, Terminal and Intermediate Groins and 125' Berm Width	15,199,400
IV	7800' of Rock Revetment	2,531,000

\* The first costs for Plans I, II and III are based on obtaining the required sandfill from a land based source in Ossipee, New Hampshire

TABLE III  
ESTIMATED ANNUAL CHARGES FOR NORTH AND FOSS BEACHES

<u>PLAN NO.</u>	<u>DESCRIPTION</u>	<u>ANNUAL<sup>1</sup> CHARGES</u>	<u>ANNUAL<sup>2</sup> CHARGES</u>
<u>NORTH BEACH</u>			
I A	7200' of Sandfill, Terminal Groins and 50' Berm Width	\$284,500	\$573,200
I B	7200' of Sandfill, Terminal Groins and 75' Berm Width	330,900	644,700
I C	7200' of Sandfill, Terminal Groins and 100' Berm Width	391,300	803,700
I D	7200' of Sandfill, Terminal Groins and 125' Berm Width	440,800	918,600
II A	7800' of Sandfill with a 50' Berm Width	271,200	589,400
II B	7800' of Sandfill with a 75' Berm Width	315,000	691,000
II C	7800' of Sandfill with a 100' Berm Width	375,000	830,000
II D	7800' of Sandfill with a 125' Berm Width	428,000	952,000
III A	7200' of Sandfill, Terminal and Intermediate Groins and 50' Berm Width	457,600	749,600
III B	7200' of Sandfill, Terminal and Intermediate Groins and 75' Berm Width	520,400	860,000
III C	7200' of Sandfill, Terminal and Intermediate Groins and 100' Berm Width	594, 100	1,005,800
III D	7200' of Sandfill, Terminal and Intermediate Groins and 125' Berm Width	659,300	1,136,50
IV	7800' of Rock Revetment	189,000	-
<u>FOSS BEACH</u>			
I	Stone Mound 4000' long	44,600	-

<sup>1</sup> The Annual charges for Plans I, II and III for North Beach are based on obtaining the required sand-fill offshore at the entrance to Newburyport Harbor, Massachusetts

<sup>2</sup> The Annual Charges for Plans I, II and III for North Beach are based on obtaining the required sand-fill from a land based source at Ossipee, New Hampshire.

## *Benefits*

An estimate of all the benefits expected to result from each of the alternative plans of improvement was made for each of the beach areas. Only those tangible benefits to which a monetary value can be assigned have been included. The intangible benefits such as increasing the desirability of the beach area, increasing the property values and enhancing the social well-being of the people in the area were not evaluated.

At North Beach the primary benefits have been based on (1) the reduction in the cost of maintenance to the highway, concrete seawall, steel sheet pile bulkhead, backshore residences and structures (2) and the encouragement of the healthful recreation of the populace by protection and improvement of the dry beach area. No recreational benefits can be taken for Plan IV since no recreational beach area is being created.

It has been reported by officials of the State of New Hampshire that the cost of cleanup of sand, rocks and other debris from the highway and repairs to the concrete seawall and steel sheet pile bulkhead is about fifty thousand dollars annually at North Beach. If any of the plans of improvement are implemented, it is estimated that these annual maintenance charges will be reduced by eighty percent. This would amount to an annual savings of forty thousand dollars.

At the present time during severe coastal storms, waves break on and overtop the existing seawall and bulkhead. These occurrences cause some flooding and other damages to the backshore structures as well as the highway. It has been estimated that individual property owners on the west side of the highway spend an average of two hundred dollars a year repairing the storm damages which occur to the structures and removing debris from around the buildings. About fifty structures are affected, resulting in a total annual cost of ten thousand dollars. It is reasonable to assume that if any of the

considered plans of protection are constructed about eighty percent of these annual repair costs will be eliminated, resulting in an annual savings of eight thousand dollars.

A major portion of the benefits associated with a sandfill beach erosion control project such as that for Plans I, II and III at North Beach are derived from the expected use of the recreational beach area which they provide. The estimated recreational benefits for North Beach are based on beach use demand projections, a 78 day swimming season including an allowance for bad weather; variable beach berm widths of from fifty feet to one hundred and twenty-five feet; and an allowance of 75 square feet of dry beach area per bather with an assumed turnover rate of two being used for peak weekends and holidays. A beach user fee of \$0.80 per person was used due to the relatively undeveloped nature of the beach. The below listed assumptions were made in establishing the recreational benefits for Plans I, II and III at North Beach.

a. After the project is constructed, the beach demand will continue to increase in a straight line fashion until it equals the supply. The demand will remain constant at this upper limit for the remainder of the project life. The point of time in the future at which the supply was assumed to equal the demand was adjusted to reflect the magnitude of the plan being considered.

b. The required amount of parking would be made available as the demand increased. Assuming a turnover rate of 1.5 per parking space, anywhere from 2400 to 4000 additional parking spaces would be needed to accommodate the crowds on peak days, depending on the magnitude of the project constructed.

c. Sufficient access roads will be available to accommodate the anticipated volume of traffic into and out of the area without causing undo congestion.

d. The required public bathhouses, sanitary and other concomitant facilities would be provided.

Table IV gives a list of the recreational beach benefits, as well as a summary of all the benefits associated with all the considered plans of protection for North Beach. It should be emphasized that the recreational benefits for the proposed projects at North Beach are predicated on the fact that adequate parking, access roads, bathhouses, sanitary and other concomitant facilities will be provided by the locals as needed. However, all land on the west side of the roadway, behind the existing developed strip of houses, is salt water marshland. Based on this fact it does not appear that there is any suitable land available in the immediate backshore area to accommodate the above mentioned items without adversely affecting the salt water marsh area. In addition, the permanent and seasonal residents in the North Beach area have indicated that they are opposed to anything which would drastically change the existing character of the area. It appears that a large portion of the recreational benefits associated with the beach projects may not be realized due to the environmental and physical constraints in the area. A more detailed discussion of the benefits is contained in Appendix A.

At Foss Beach no sandfill plan of protection was developed and therefore no recreational benefits can be realized. The primary benefits which can be attributed to the stone mound protection plan are the reduction or elimination of repairs to the highway and minor repairs to the private structures on the west side of the roadway. It has been estimated that the cost of these repairs averages about \$5,000 annually. The stone mound would reduce these annual cost by about eighty-five percent resulting in an annual benefit of \$4,250.

TABLE IV

SUMMARY OF ANNUAL BENEFITS FOR NORTH BEACH

<u>PLAN NO.</u>	<u>DESCRIPTION</u>	<u>RECREATION BENEFITS</u>	<u>REDUCTION IN MAINTENANCE TO HIGH- WAY, PROTECTIVE STRUC- TURES AND RESIDENCES</u>	<u>TOTAL ANNUAL BENEFITS</u>
IA	7200' Sandfill, terminal groins and 50' berm width	\$516,000	\$48,000	\$564,000
IB	7200' Sandfill, Terminal Groins and 75' berm width	545,000	48,000	593,000
IC	7200' Sandfill, terminal groins and 100' berm width	591,000	48,000	639,000
ID	7200' Sandfill, terminal groins and 125' berm width	634,000	48,000	682,000
IIA	7800' of Sandfill with a 50' berm width	534,000	48,000	582,000
IIB	7800' of sandfill with a 75' berm width	580,000	48,000	628,000
IIC	7800' of sandfill with a 100' berm width	624,000	48,000	672,000
IID	7800' of Sandfill with a 125' berm width	666,000	48,000	714,000
IIIA	7200' of Sandfill, terminal and intermediate groins and 50' berm width	516,000	48,000	564,000
IIIB	7200' Sandfill, terminal and intermediate groins and 75' berm width	545,000	48,000	593,000
IIIC	7200' Sandfill, terminal and intermediate groins and a 100' berm width	591,000	48,000	639,000
IIID	7200' Sandfill, terminal and intermediate groins and a 125' berm width	634,000	48,000	682,000
IV	7800' of Rock Revetment	—	48,000	48,000

## *Justification*

Table V shows a summary of the economics associated with the considered plan of protection for Foss Beach.

TABLE V

SUMMARY OF ECONOMIC ANALYSIS FOR FOSS BEACH

Description:	4,000 foot long stone mound
Annual Charges:	\$44,600
Annual Benefits:	\$4,250
Benefit-to-Cost Ratio:	0.10
Excess of Benefits Over Costs:	-\$40,350

Table V shows that the stone mound protection plan has a very low benefit-to-cost ratio of 0.10 indicating no economic justification for its construction at this time.

A summary of the economic analysis for the various considered plans of protection for North Beach, based on obtaining the required sandfill from an offshore site, is shown in Table VI. Table VII shows a similar summary based on obtaining the sandfill from a land based pit. As seen in Table VI, all of the plans which include sandfill for North Beach have a benefit-to-cost ratio in excess of 1.0, which indicates there is economic justification for construction of these projects. Plan IIA has the highest benefit-to-cost ratio (2.15) of all the plans. Plan IIB provides the best maximization of net benefits by having the largest excess of benefits over costs. Plan IV does not show economic justification. However, it should be emphasized that figures shown in Table VI are based on the assumption that sand will be obtained from a relatively cheap offshore source and the further assumption that there are no constraints to prevent the beach from being utilized to its full capacity.

TABLE VI

SUMMARY OF ECONOMIC ANALYSIS FOR NORTH BEACH

<u>PLAN NO</u>	<u>DESCRIPTION</u>	<u>ANNUAL<sup>1</sup> CHARGES</u>	<u>ANNUAL BENEFITS</u>	<u>BENEFIT COST RATIO</u>	<u>EXCESS BENEFITS OVER COSTS<sup>2</sup></u>
1A	7200' of Sandfill, Terminal Groins & 50' berm width	\$284,500	\$564,000	1.98	\$279,500
IB	7200' of Sandfill, Terminal Groins & 75' berm width	330,900	593,000	1.79	262,100
IC	7200' of Sandfill, Terminal Groins & 100' berm width	391,300	639,000	1.63	247,700
ID	7200' of Sandfill, Terminal Groins & 125' berm width	440,800	682,000	1.55	241,200
IIA	7800' of Sandfill with a 50' berm width	271,200	582,000	2.15	310,800
IIB	7800' of Sandfill with a 75' berm width	315,000	628,000	1.99	313,000
IIC	7800' of Sandfill with a 100' berm width	375,000	672,000	1.79	297,000
IID	7800' of Sandfill with a 125' berm width	428,000	714,000	1.67	286,000
IIIA	7200' of Sandfill, Terminal and Intermediate Groins and 50' berm width	457,600	564,000	1.23	106,400
IIIB	7200' of Sandfill, Terminal & Intermediate Groins and 75' berm width	520,400	593,000	1.14	72,600
IIIC	7200' of Sandfill, Terminal & Intermediate Groins and 100' berm width	594,100	639,000	1.07	44,900
IIID	7200' of Sandfill, Terminal & Intermediate Groins and 125' berm width	659,300	682,000	1.03	22,700
IV	7800' of Rock Revetment	189,000	48,000	0.25	-141,000

<sup>1</sup> The annual charges for Plans I, II and III are based on obtaining the required sandfill offshore at the entrance to Newburyport Harbor, Massachusetts

<sup>2</sup> Minus figures indicate that the annual charges exceed the annual benefits.

TABLE VII

SUMMARY OF ECONOMIC ANALYSIS FOR NORTH BEACH

<u>PLAN NO</u>	<u>DESCRIPTION</u>	<u>ANNUAL CHARGES</u> <sup>1</sup>	<u>ANNUAL BENEFITS</u>	<u>BENEFIT COST RATIO</u>	<u>EXCESS BENEFITS OVER COSTS</u> <sup>2</sup>
IA	7200' of Sandfill, Terminal Groins and 50' berm width	\$573,200	\$564,000	0.98	\$ -9,200
IB	7200' of Sandfill, Terminal Groins and 75' berm width	644,700	593,000	0.92	-51,700
IC	7200' of Sandfill, Terminal Groins and 100' berm width	803,700	639,000	0.80	-164,700
ID	7200' of Sandfill, Terminal Groins and 125' berm width	918,600	682,000	0.74	-236,600
IIA	7800' of Sandfill, with a 50' berm width	589,400	582,000	0.99	-7,400
IIB	7800' of Sandfill with a 75' berm width	691,000	628,000	0.91	-63,000
IIC	7800' of Sandfill with a 100' berm width	830,000	672,000	0.81	-158,000
IID	7800' of Sandfill with a 125' berm width	952,000	714,000	0.75	-238,000
IIIA	7200' of Sandfill, Terminal and Intermediate Groins and a 50' berm width	749,600	564,000	0.75	-185,600
IIIB	7200' of Sandfill, Terminal and Intermediate Groins and 75' berm width	860,000	593,000	0.69	-267,000
IIIC	7200' of Sandfill, Terminal and Intermediate Groins and 100' berm width	1,005,800	639,000	0.64	-366,800
IIID	7200' of Sandfill, Terminal and Intermediate Groins and 125' berm width	1,136,500	682,000	0.60	-454,500
IV	7800' of Rock Revetment	189,000	48,000	0.25	-141,000

<sup>1</sup>The annual charges for Plans I, II and III are based on obtaining the required sandfill from a land based source at Ossipee, New Hampshire

<sup>2</sup>Minus figures indicate that the annual charges exceed the annual benefits.

Table VII reflects what happens if a land based source of sand is utilized for the plans which include sandfill. The benefits are the same as those shown in Table VI. As seen from the table, none of the sandfill plans have a benefit-to-cost ratio of 1.0 or greater, which indicates that they are not economically justified.

Other important factors which need to be considered in the justification of an improvement project are how closely it meets the needs of State and local interests and other concerned groups and its acceptance or non-acceptance by them, as well as by other Federal agencies.

A workshop meeting, as mentioned in the section entitled "Study Participants and Coordination", was held on 19 December 1975 in Concord, New Hampshire to present the plans of improvement discussed in this report to Federal, State and local officials and interests. The written and verbal responses received at and subsequent to the meeting indicated a relative lack of interest in pursuing any of the alternative plans.

The Hampton Board of Selectmen and the Hampton Planning Board conducted a public meeting on 21 July 1976 to present the alternative plans of improvement which had been developed for the North Beach area. The meeting was attended by approximately 300 Hampton residents, most of whom lived in the North Beach area. By a unanimous vote the people favored not having the Corps construct any beach erosion control project at North Beach. (The minutes of this public hearing and other pertinent study correspondence are contained in Appendix B.)

## *STATEMENT OF FINDINGS*

This study has reviewed and evaluated all the pertinent documents and views of interested agencies and the concerned public with the intent of determining the feasibility of providing beach erosion control measures at North and Foss Beaches.

Four alternative plans of protection were evaluated for North Beach. Three plans dealt with the construction of a protective barrier beach by the placement of suitable sandfill, with four different beach berm widths ranging from fifty feet to one hundred and twenty-five feet. It was determined if the sandfill material could be obtained offshore at the entrance to Newburyport Harbor, Massachusetts, and if the beaches which would be created could be utilized to their full capacity then any of the twelve different beach sizes would be economically justified. If the required sandfill had to be obtained from a land based borrow pit in Ossipee, New Hampshire it was found that the additional costs involved would make the sandfill plans uneconomical. The fourth plan involved the construction of rock revetment in front of the existing steel sheet pile bulkhead and concrete seawall, which run along the back beach area. The rock revetment plan was found to be economically unfeasible.

At Foss Beach no sandfill plan was evaluated due to the physical and environmental constraints in the area. A stone mound protection plan was considered for the area. The mound would extend along the entire 4,000 feet of the back beach area. It was determined that this stone mound was not economically justified.

Initial indications are that none of the considered plans of protection for both beach areas would have any significant long term adverse impact on the study areas themselves.

## *DISCUSSION*

The shoreline at both North and Foss Beaches has periodically experienced accretion and erosion for a number of years. The overall problem is one of gradual erosion and recession of the shoreline resulting in the loss of protective and recreational beach area and exposure of

the backshore structures and facilities to flooding and other associated storm damage. This study was undertaken to determine if there is an economically, technically and environmentally feasible plan of improvement and protection which could be developed at each of the beaches to help prevent the storm damage and to provide for the recreational bathing needs in the area.

As was mentioned earlier in this report, three of the four alternative plans of improvement which were developed for North Beach were found to be economically justified. However, the economics of these plans are based on a number of assumptions that are not acceptable. The first is, the sandfill material would be obtained from an offshore bar at the entrance to Newburyport Harbor, Massachusetts. This is not acceptable due to the following: (1) the Commonwealth of Massachusetts currently has a moratorium on the mining of sand and gravel in its territorial waters and it does not appear that this moratorium will be lifted in the near future; (2) the open ocean exposure of both the potential borrow site and project site may cause difficulties during the dredging and placement operations, which may necessitate additional steps being taken at additional cost; and (3) a detailed analysis would have to be made to determine if dredging the material from this offshore bar would have an adverse impact on the shoreline at Plum Island and Salisbury Beach as well as the marine environment in the borrow area. If it was found that it did have an adverse impact this would not be acceptable as a borrow source. The second assumption is, if the beaches were constructed as indicated in the first three plans there would be no constraints to prevent them from being utilized to their full capacities. The recreational benefits associated with these protection projects comprise the major portion of the benefits to be derived from the projects. However, there are a number of physical and environmental issues and problems associated with these plans that have to be resolved before the maximum amount of such benefits can be derived. These items include the following: (1) at the present time there are

only about 900 parking spaces available at North Beach. In order to assure that the various size beaches considered are utilized to their full capacity anywhere from 2,400 to 4,000 additional parking spaces would be required. Most of the undeveloped land in the backshore area at North Beach is salt water marshland and it would not be environmentally acceptable to fill any of this marshland to provide parking spaces; (2) presently, the roadways in the Hampton Beach and North Beach areas are heavily congested during peak weekends and holidays during the beach season. On busy days the roadways south of North Beach are closed to through traffic, restricting access to North Beach. If a beach project was built additional access roads would be required to channel the anticipated volume of traffic into and out of the area as quick as possible. This may prove to be very costly and it would probably not be environmentally acceptable to have a road or a number of roadways running through the salt water marsh area; and (3) if North Beach is to be fully developed, more bathhouses, sanitary facilities, concession stands, restaurants, hotels and motels would be required. This would greatly change the character of the existing development in the backshore area. It has been strongly indicated that making any major changes in the general character of the area would be unacceptable to the permanent and seasonal residents of the area.

Based on the problems associated with the first three plans of protection for North Beach, it does not appear that the construction of these plans is feasible at the present time. Obtaining the required sandfill from a land based borrow pit at Ossipee, New Hampshire would make the sandfill plans uneconomical. At the present time there is no known offshore potential borrow site in New Hampshire territorial waters which has the required quantity and quality of sandfill material needed. The fourth plan of protection which involved the construction of a rock revetment all along the front of the steel sheet pile bulkhead and concrete seawall was found to be economically unfeasible.

At Foss Beach no sandfill plan of improvement was developed due to the physical and environmental constraints in the area. The stone mound plan of protection developed for the area was not found to be economically justified.

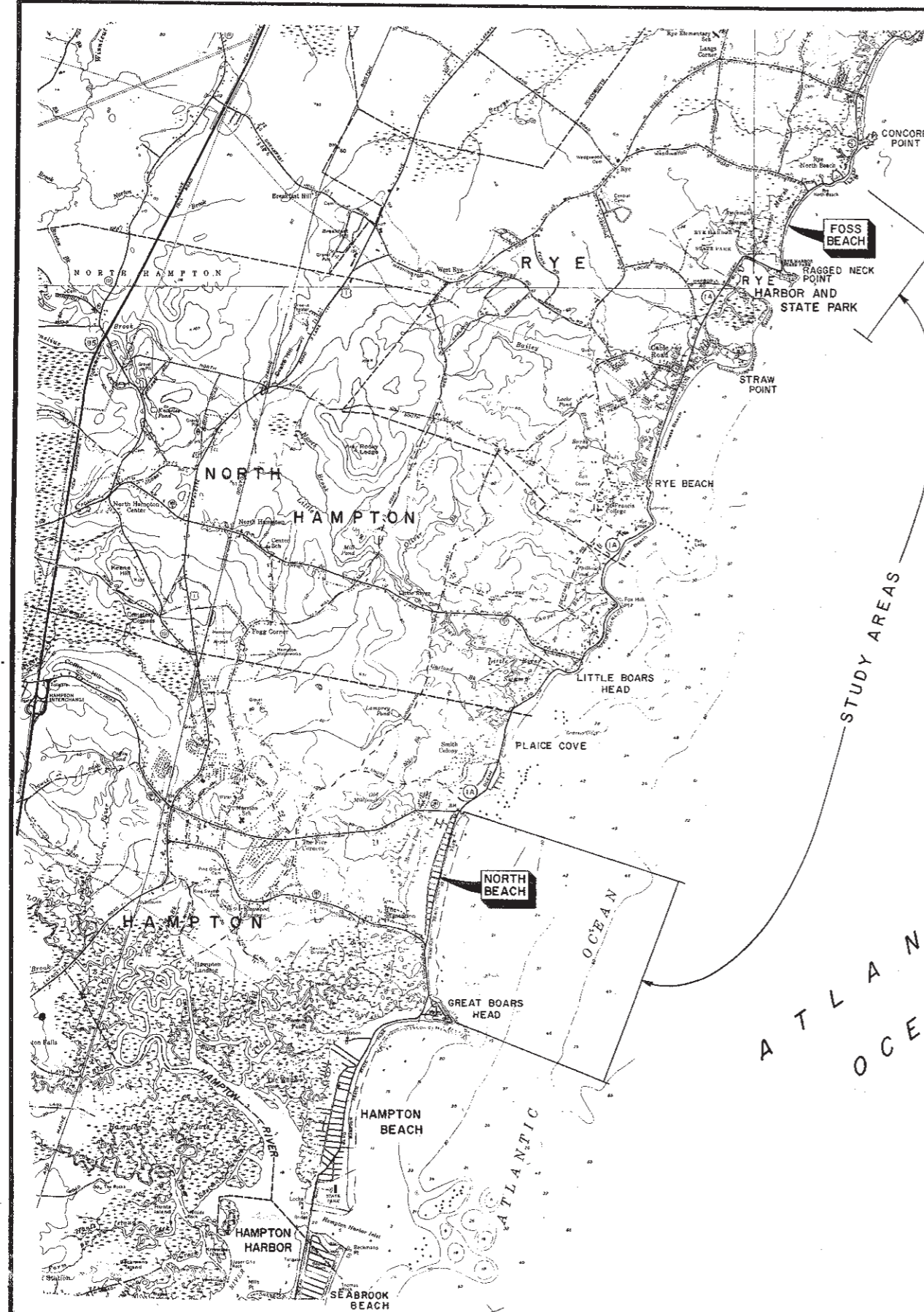
## *RECOMMENDATIONS*

The Division Engineer recommends that no sandfill beach erosion control project be adopted by the United States for providing protection against erosion and storm damage along the North Beach shoreline until a suitable source of sand can be found and the existing constraints dictating against full use of a beach project can be resolved. In addition, it is recommended that no rock revetment project be adopted due to a lack of economic justification.

It is recommended that no beach erosion control project be adopted by the United States for providing protection against erosion and storm damage along the shorefront at Foss Beach in light of the lack of economic justification.

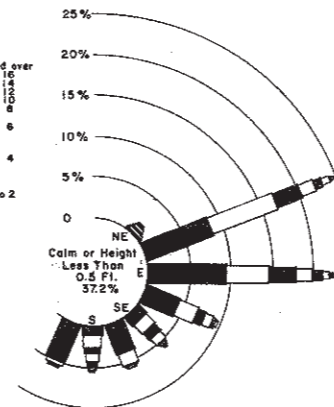
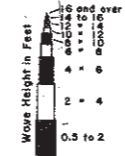
It is further recommended that if local or State interests wish to provide protective measures at either of these beaches to meet their needs, such measures be accomplished along the lines of those considered in this report.

JOHN P. CHANDLER  
Colonel, Corps of Engineers  
Division Engineer



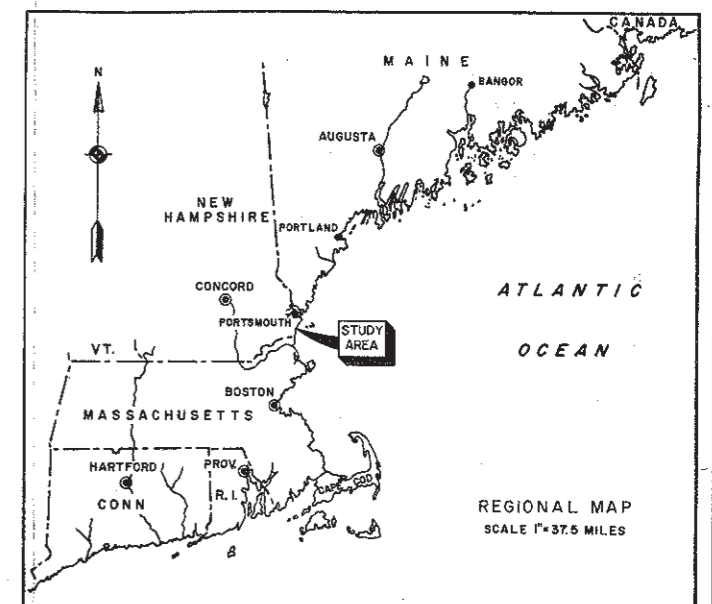
From Beach Erosion Board Technical Memorandum No. 55

## LEGEND



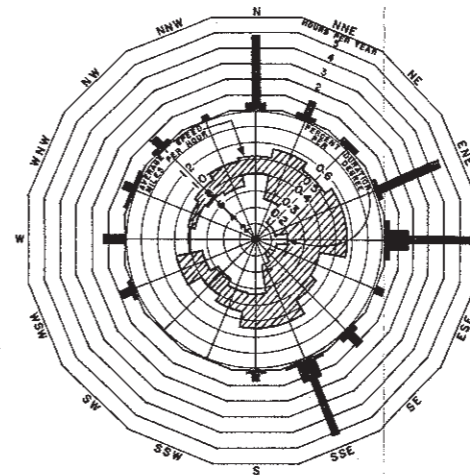
## WAVE DIAGRAM-OFF PENOBSCOT BAY

(LAT. 43° 50' N, LONG. 68° 00' W)  
 SHOWING PERCENT OF TIME WAVES OF  
 DIFFERENT HEIGHT OCCUR FROM EACH DIRECTION  
 HINDCAST FROM SYNOPTIC WEATHER CHARTS  
 FOR THREE YEAR PERIOD 1948-1950



## NOTE

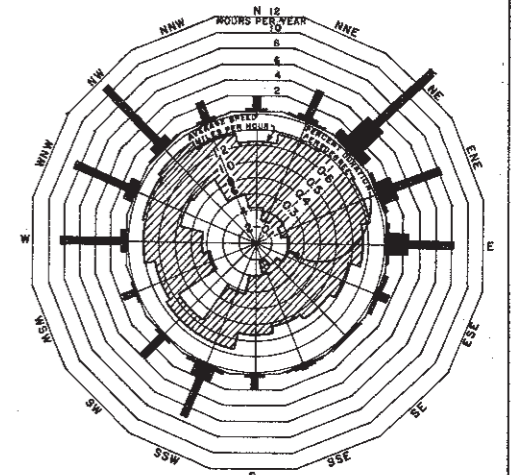
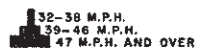
PERCENT DURATION PER DEGREE IS THE AVERAGE  
 PERCENT DURATION OBSERVED FOR EACH OF 16  
 POINTS OF THE COMPASS DIVIDED BY 22 1/2 DEGREES.



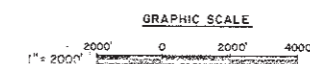
**WIND DIAGRAM**  
 PORTLAND, MAINE  
 OCTOBER 1949-SEPTEMBER 1958 INCLUSIVE  
 BASED ON HOURLY OBSERVATIONS  
 BY THE U.S. WEATHER BUREAU

## LEGEND

WINDS GREATER THAN  
 32 MILES PER HOUR



**WIND DIAGRAM**  
 BOSTON, MASS.  
 OCTOBER 1949-SEPTEMBER 1958 INCLUSIVE  
 BASED ON HOURLY OBSERVATIONS  
 BY THE U.S. WEATHER BUREAU



BEACH EROSION CONTROL STUDY OF  
 NORTH BEACH & FOSS BEACH  
 HAMPTON & RYE, NEW HAMPSHIRE

LOCATION MAP

NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
 AUGUST 1977

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NORTH BEACH  
TOWN OF HAMPTON  
AND  
FOSS BEACH  
TOWN OF RYE  
NEW HAMPSHIRE

BEACH EROSION CONTROL  
REPORT

NORTH BEACH - TOWN OF HAMPTON  
AND  
FOSS BEACH - TOWN OF RYE  
NEW HAMPSHIRE  
BEACH EROSION CONTROL  
REPORT

**TECHNICAL REPORT**

- SECTION 1. PROFILE OF STUDY AREAS  
SECTION 2. ESTIMATED FIRST COSTS  
AND ANNUAL CHARGES  
FOR THE CONSIDERED  
PLANS OF IMPROVEMENT  
SECTION 3. ESTIMATE OF BENEFITS

PREPARED BY THE  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
DEPARTMENT OF THE ARMY

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# **SECTION 1**

**PROFILE OF STUDY AREAS**

# PROFILE OF STUDY AREAS

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## SECTION I

# PROFILE OF STUDY AREAS

### Geography

1. Foss Beach is located in the town of Rye in Rockingham County on New Hampshire's 18 mile long coast, just north of Rye Harbor. The town of Rye encompasses a total area of 14 square miles, including 1.4 square miles of water, and has extensive ocean frontage with 12 access points for recreational use. Land in the town rises from sea level to a maximum height of 188 feet above sea level.

2. North Beach is located in the town of Hampton in Rockingham County, New Hampshire, directly north of the Massachusetts border. The town of Hampton encompasses a total area of 13.5 square miles, including .3 square miles of water, with about five miles of ocean frontage. Land in the town rises from sea level to a high point of 140 feet above sea level. North Beach is separated from the more popular Hampton Beach by a point of land called Great Boars Head.

3. These coastal areas are attractive to bathers, vacationers and individuals on a picnic. They are open for business from May 15 to September 30, with the intensive business season ranging from July 1 to Labor Day. Approximately half of the people who visit these coastal areas come from Massachusetts. According to a 1972 survey, five percent of the vacationers were from Canada and ten percent from the Great Bay Region of New Hampshire which consists of Strafford and Rockingham Counties.

4. Foss Beach is 3 miles and North Beach is 8 miles south of Portsmouth, New Hampshire, the nearest urban center of significant size. Both beaches are a short drive from the metropolitan areas of

Concord and Manchester, New Hampshire, and are easily accessible to other parts of New England by a good network of interstate highways.

## Transportation

5. Interstate Highway 95 is a major north-south highway passing through the coastal region of New Hampshire. This highway also passes through the Boston Standard Metropolitan Statistical Area, the city of Providence and several metropolitan areas in Connecticut. It is paralleled by Route 1 and the winding coastal highway 1-A to the east. The main east-west route, State Highway 101, connects the coast with Greater Manchester and I-93. However, it is not as efficient as the north-south system in facilitating the flow of traffic to and from the region.

6. There is no passenger rail service in the area, but the Boston and Maine Railroad provides freight service. Freight is also handled by a number of trucking firms. There are major bus companies serving the coast and the nearest municipal commercial airport is in Manchester.

7. Portsmouth Harbor is a year-round port, accommodating up to 30,000 ton vessels. The New Hampshire State Port Authority handles containerized cargo arriving and departing this port.

## Land Use

8. In the region, there are two major concentrations of industry. One lies along the Piscataqua River on the Portsmouth-Newington line and a second is located off Lafayette Road (Route 1) in Portsmouth.

The rest of the region has smaller areas, containing single firms at scattered locations. Eighty-eight percent of the region's land is vacant and undeveloped.

9. An urban central business district exists in Portsmouth and less extensive districts are found in Exeter and Hampton. Route 1, which runs through a number of municipalities, is the scene of strip commercial development. Ocean front commercial activity is limited by New Hampshire's brief shoreline. Most activity occurs at Hampton Beach State Park. Portsmouth, Exeter and Hampton possess some significant pockets of high density residential areas which contain more than 4 dwelling units per acre.

10. The town of Rye is primarily a resort town with much of its economic base dependent on tourists attracted to its beaches. Retail outlets include a number of grocery stores, restaurants, auto repair and service stations, drug stores and a few retail shops. There is no manufacturing. The coast line of Rye includes the State Parks of Wallis Sands, Rye Harbor and Odiornes Point. Eighty percent of the land in Rye is vacant and only 71% of this land is buildable.

11. The town of Hampton is comprised of a section of heavy density residential development along Lafayette Road (Route 1), some light density residential areas and a recreational area known as Hampton Beach State Park. However, there is still some vacant land available which is zoned for industry. The Southeastern New Hampshire Regional Planning Commission has determined that 59% of the land in Hampton is vacant. However, because the coastal area has many pockets of salt-water marshland only 30% of this vacant land is available to build on. Hampton is desirous of building its image as a tourist and recreational center. However, since the

North Beach District is almost totally developed, there has only been a limited amount of new apartment construction in the area.

## Housing

12. Approximately 75% of Rye's total year-round housing is owner-occupied.\* Renters account for the remaining 25% of the total homes. Seventy-nine percent of the year-round housing is made up of single unit structures. Forty-two percent of Rye's housing stock was built prior to 1939 and only 17.3% was built in the 1960's. Because of the recent recession, construction of large expensive homes has been severely restricted, but building activity is expected to increase in this area over the next 20 years.

13. At North Beach during the non-beach season, many of the homes are rented to students from the University of New Hampshire in nearby Durham and to navy personnel from Portsmouth. These people are required to leave in the summer months because landlords rent the cottages to vacationers at a higher rental fee. In 1970, 3000 people, or 37% of the total population, were year round residents in the Hampton Beach Precinct. Of these 3000, about 700 lived in the North Beach area. Seventy-three percent of the year-round homes in the town are owner occupied according to figures compiled by the Southeastern New Hampshire Regional Planning Commission. According to the 1970 census, 49.1% of the housing units in the town are occupied year round. Construction of homes has been orientated toward the summer residences, coinciding with the town's philosophy of strenghtening its recreational and vacation image. Single unit structures accounted for 76% of the year-round housing and only 16% of the housing consisted of 3 or more units. Thirty-seven percent of the homes were built before 1950. With the continuation of the housing boom in the 1960's, new structures accounted for 31% of the total homes.

\*According to the 1970 U. S. census figures.

Appendix A

14. Because of a large amount of seasonal housing during the summer months Hampton's population is usually found to be more than double that of the year round population. Hampton has the greatest amount of summer cottages, boarding houses and motels in the coastal area. Many summer homes and apartments have been converted into year-round dwellings.

## Population

15. From 1950-1970, the population in the Great Bay Region increased 75%. The region's growth appears to be based on its natural resources, its inherent attractiveness, the "spillover" from the Boston Metropolitan Area, an increase in the demand for year-round residents along the shore area and the availability of low cost developable land for residential use. The 'spillover' effect reflects the movement of people out of high density areas into low density quasi rural areas.

16. Rye's population increased by 2100 people during the past two decades, reflecting an increase of about 106%. According to 1970 density information obtained from the 1970 U. S. Census Report, the town is relatively undeveloped. Rye's 1970 population of 4083 is expected to more than double by 1990 and then triple by 2020, based on population projections developed by the Southeastern New Hampshire Regional Planning Commission shown in Table I. These projections show Rye as being a fast growing residential area which will eventually surpass Hampton in future population. The age profile of the community is relatively young with only about 29% of the population being older than 44.

TABLE I

## EXISTING AND PROJECTED POPULATION FIGURES

	<u>Population</u>				
	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1990</u>	<u>2020</u>
Rye	1,982	3,244	4,083	8,500	24,000
Great Bay	121,622	158,828	209,382	377,000	1,066,000
New Hampshire	533,000	607,000	738,000	1,167,000	2,384,000

17. With an increase in its population of 5000 during the past 20 years, Hampton has become the ninth most densely populated community in the state. This reflects a percent change in population of 167% during this period. In 1970, there were only 165 people per square mile in the Great Bay Region compared to 607 for the town of Hampton. By 1990 Hampton's population is expected to grow by an additional 50%. Hampton's population growth rate exceeded that of the Great Bay Region and the State during the 20 years from 1950 to 1970. However, Hampton's population growth rate is expected to slow down considerably by 1990 as shown in Table II, which is based on projections developed by the Southeastern New Hampshire Regional Planning Commission.

18. During the summer months, Hampton's overnight population at least doubles. Since 50.9% of Hampton's housing units were seasonal in 1970, their conversion to year-round use could lead to the doubling of the town's permanent population. This doubling would increase the density to 1213.8 persons per square mile. However, the prospect of this change is doubtful because the town wishes to retain its image as a recreational and vacation center. Nevertheless, such a population increase could be realized if Seabrook Atomic Plant is constructed. The housing needs of the 1000 construction workers, though temporary, could lead to the conversion.\*

\*Hampton Beach: Recommendation for Action Southeastern N.H. RPC

Appendix A

19. The demand for community services during the peak summer week-ends is 15 times the amount during the winter months. Hampton is required to double its rubbish pickups during the summer period and the treatment plant has to handle three times as much sewage. The trade-off that the town experiences is that of the economic benefits derived from tourism vs. traffic congestion and an increase in the demand for community services.\*

20. In 1960, 72% of the population were younger than age 44 and 33% were under age 14. This resort community apparently does not appeal to the middle aged and the elderly as a permanent residence. Eight percent of the population was native born.

TABLE II

EXISTING AND PROJECTED POPULATION FIGURES

	<u>Population</u>				
	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1990</u>	<u>2020</u>
Hampton	2,847	5,379	8,011	12,200	20,000
Great Bay	121,622	158,828	209,382	377,000	1,066,000
New Hampshire	533,000	607,000	738,000	1,167,000	2,384,000

## Income

21. Rye is a bedroom community consisting of upper-middle income professional people with a number of estates bordering the coast. Of the total population 64.2 percent work in Rockingham County and most of the remainder work in the Boston Standard Metropolitan Statistical Area. Compared to the Great Bay Region and the State of New Hampshire, both the median family income and the per capita income of Rye residents were higher in 1970 as shown in Table III.

\*Hampton Beach: Recommendation for Action Southeastern N.H. RPC

Appendix A

TABLE III

## PERSONAL INCOME

	<u>Median Family Income</u>	<u>Per Capita Income</u>
Rye	\$10,819	\$3,847
Great Bay Region	9,780	2,610
New Hampshire	9,668	2,590

22. Hampton is also a bedroom community consisting of upper-middle income professional people. Sixty-eight percent of the populace works in Rockingham County and most of the remainder are employed in management positions along Boston's circumferential highway, Route 128. Compared to the Great Bay Region and the State of New Hampshire, personal income in Hampton is higher. For 1970, the median income was 7.6% and 8.6% greater respectively and per capita income was 20% higher as shown in Table IV.

TABLE IV

## PERSONAL INCOME

	<u>Median Family Income</u>	<u>Per Capita Income</u>
Hampton	\$10,583	\$3,290
Great Bay Region	9,780	2,610
New Hampshire	9,668	2,590

## Economic Activities

23. The Portsmouth Labor Market Area includes nine towns on the seacoast of New Hampshire and is divided into two job centers. The Portsmouth Job Center, including Rye but excluding workers at the Portsmouth Shipyard, consists of five communities. Based on figures

obtained from the New Hampshire Office of Industrial Development for 1970 this job center had a labor force participation rate of 32.6%, the lowest in the state. The second known as The Hampton Job Center, which includes the town of Hampton, had a labor force participation rate of 39.1% in 1970. Hampton is the largest of the 4 communities which comprise this job center. The Portsmouth Naval Shipyard is a major repair facility in Portsmouth Harbor. With 8,000 people employed at this facility, the shipyard is very important to the regional economy. In 1970 the state average labor force participation rate was 40.2%.\*

24. The Southeastern Region of New Hampshire includes the heavy industrial town of Portsmouth, as well as the residential and tourist oriented towns of Hampton and Rye. This accounts for the fact that approximately one-third of the total employment in the Southeastern Region is involved with both manufacturing and trade. With the many commercial activities catering to tourism, Hampton is heavily dominant in the trade category, which is about 60% greater compared to the Great Bay Region or the State of New Hampshire. Table V gives a comparison between the Southeastern Region, Great Bay Region and the State of New Hampshire of selected employment characteristics by industry division for 1970.

\*N.H. Office of Industrial Development. Portsmouth Labor Market Area. Oct. 1973 P. 4

TABLE V

## SELECTED EMPLOYMENT CHARACTERISTICS BY

## INDUSTRY DIVISION - 1970 (BASED ON PLACE OF EMPLOYMENT)

	Southeastern	Great Bay	N.H.
	<u>Region</u>	<u>Region</u>	
Agriculture & Mining	-	1.9	1.9
Construction	5.1	6.4	6.3
Manufacturing	32.8	37.2	33.5
T.C.P.U.	5.1	4.8	4.3
Trade	31.2	18.9	17.4
F.I.R.E.	5.9	3.2	3.7
Services & Others	15.6	27.8	32.9
Total	100.0	100.0	100.0

25. The main economic activity along the coast of New Hampshire is tourism. Motels, restaurants, souvenir shops, amusement parks, marinas and boatyards abound in this area.

26. Although there are many seasonable businesses in the beach areas of Rye, Foss Beach has very limited commercial activity.

27. Hampton is the largest recreation and vacation center in this area, containing more enterprises than the rest of the state shore areas combined. There is a very small industrial base in the town. In 1970, manufacturing accounted for 177 jobs.

## Physical Description of Beach and Protective Structures

28. Foss Beach is a barrier bar, with a length of about 4000 feet which fronts a salt water marsh. The beach is bounded on the south by a low narrow projection of land known as Ragged Neck Point and on the north by Rye North Beach. The beach area is shown on Plate No. 3 in the main report.

29. Foss Beach primarily consists of a shingle ridge above high water and sand below high water. Along the northern portion of the beach there are some sandy areas above mean high water in front of the shingle ridge. The backshore area of the beach is bounded by Route 1A, a state highway which parallels the shore area. A cobble and shingle ridge forms a natural barrier between the beach and the highway.

30. The New Hampshire State Highway Department constructed a dry masonry stone wall for a distance of approximately 535 along the central portion of the beach around 1931, to protect the backshore roadway and structures against storm damage and flooding. The wall was built on top of the existing shingle ridge and the toe of the wall was protected by riprap. Today most of the wall is buried under the shingle ridge which forms a natural barrier along the backshore of the beach.

31. North Beach is a coastal barrier bar approximately 1.7 miles long which fronts a salt water marsh area. It is bounded on the south by a high projecting glacial till headland known as Great Boars Head and on the north by Plaice Cove. This study deals with the southerly 7,800 feet of beach beginning at Great Boars Head and extending northward, as shown on Plate No. 2 in the main report.

32. The existing beach itself is narrow, consisting of shingles along its southern half and changes northward to fine and medium sand with a scattering of gravel and boulders. The sand and gravel continues northward to Plaice Cove and is interspersed with bedrock outcrops. The state highway Route 1A, which parallels the entire shoreline of the state, forms the backshore limit of the beach. The State of New Hampshire has constructed a steel sheet pile bulkhead and concrete seawall between the beach and the highway. Seven stone groins have also been constructed by the state in front of the concrete seawall.

33. The steel sheet pile bulkhead was constructed between 1955 and 1956 and extends northerly from Great Boars Head for a distance of approximately 3,890 feet to the south end of the existing curved face concrete seawall. The piling was driven to a bottom elevation 4 feet below the plane of mean low water. The top elevation was set at 21.0 feet above mean low water. The piling was capped by welding on a 15 inch steel channel. Access to the beach was provided through the north flanks of four bastions which project about 9 feet seaward from the bulkhead. The bulkhead replaced a shingle and riprap ridge that was leveled in connection with a highway improvement project. The bulkhead is periodically overtopped by breaking waves and wave uprush, particularly along the southern end adjacent to Great Boars Head. Rock revetment has also been placed in front of the bulkhead at the southern end to guard against undermining.

34. The curved face concrete gravity seawall was constructed between 1933 and 1934. Starting at the northern end of the steel bulkhead, the wall extends northerly for a distance of about 3,915' to the site of the former Coast Guard Station. The wall was constructed on a keyed reinforced concrete footing, one foot thick and 10 feet wide, with a bottom elevation of 8.0 feet above mean low water. The wall and footing were tied together with dowels. The face of the wall

was curved above elevation 14 feet. The wall has a top elevation of 22 feet, top width of 4 feet and bottom width of 6 feet. A stone apron was constructed along the toe of the wall throughout its length. Seven stone groins, each 100 feet long, were built perpendicular to the wall about 400 feet apart. They were built with a top width of  $3\frac{1}{2}$  feet, side slopes of 1 vertical to  $1\frac{1}{4}$  horizontal, base width of 15 feet at the toe of the apron and continuing seaward 3 feet above the beach level to their outer ends. Access to the beach is provided by steps through both flanks of eight bastions, which project about  $7\frac{1}{2}$  feet from the wall. The wall has provided adequate protection and is in reasonable good shape. The groins have experienced a considerable amount of damage during storms and are in need of repair. The beach elevation is generally the same on both sides of the groins.

# **SECTION 2**

**ESTIMATED FIRST COSTS AND ANNUAL  
CHARGES FOR THE CONSIDERED  
PLANS OF IMPROVEMENT**

# ESTIMATED FIRST COSTS AND ANNUAL CHARGES FOR THE CONSIDERED PLANS OF IMPROVEMENT

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Appendix A

## SECTION 2

# ESTIMATED FIRST COSTS AND ANNUAL CHARGES FOR THE CONSIDERED PLANS OF IMPROVEMENT

### General

1. The following pages give a description of the considered plans of improvement which were developed for North and Foss Beaches, as well as the first cost and annual charges associated with them. The plans for North and Foss Beach are shown on Plates No. 2 and 3 respectively, in the main report. The useful life of the project has been taken as fifty years. The estimates of first costs and annual charges have been based on 1977 price levels. The annual charges reflect the current directed Federal interest rate of 6 3/8 percent. The cost of construction was estimated to provide a basis for comparison between the annual charges attending the costs and the potential benefits each plan would provide. The ratio of benefits to the costs, which is known as the benefit-cost ratio, is needed to determine if there is any economic justification for constructing an improvement project.

### FOSS BEACH

2. At Foss Beach only one plan of protection was developed due to the physical and environmental constraints in the area. The plan involves construction of a stone mound formed by the placement of dumped riprap on the existing shingle beach ridge along the entire 4000' of the study area. The top elevation of the stone mound should be 19 feet above mean low water with a crest width of 5 feet, to

prevent a major portion of the damaging wave overtopping.  
The bottom of the structure should be properly toed in to prevent undermining.

## First Cost

Stone 28,000 Tons		\$420,000
Contingencies		<u>84,000</u>
	Sub-total	504,000
Engineering and Design		<u>50,400</u>
	Sub-total	554,400
Supervision and Administration		<u>49,900</u>
Total First Cost		\$604,300
Federal Share of Cost (50%)		\$302,150
Non-Federal Share of Cost (50%)		\$302,150

## Annual Charges

### Federal Investment

Interest and Amortization (0.06678 x \$302,150)	\$20,200
Total Federal Annual Charges	\$20,200

### Non-Federal Investment

Interest and Amortization (0.06678 x \$302,150)	\$20,200
Revetment Maintenance (280 Tons @ \$15.00)	<u>4,200</u>
Total non-Federal Annual Charges	\$24,400
Total Annual Charges	\$44,600

## NORTH BEACH

3. At North Beach four plans were developed to provide protection against erosion, flooding and allied storm damages. Three plans involved the creation of an artificial barrier beach to provide additional beach space which could be utilized for the healthful recreation of the populace. Two sets of first costs and annual charges have been developed for the first three plans of protection. One set was developed based on obtaining the required sandfill from the offshore sand bar at the entrance to Newburyport Harbor, Mass. The second set was developed based on obtaining the required sandfill from a land based borrow pit in Ossipee, NH. The fourth plan involved the placement of rock revetment along the entire 7800 feet of the study area at the base of the steel sheet pile bulkhead and concrete wall.

4. Table A-2 gives a summary of the first costs and annual charges for the plans of protection that were developed for both North and Foss Beaches.

## Plan I

This plan involves the placement of sandfill along approximately 7200 feet of the northerly portion of the study area to an elevation of 15 feet above the plane of mean low water and the construction of two terminal groins. One of these groins will be located at the northern limit of the study area and the other will be located approximately 600 feet north of the southern end of the study area. Various beach berm widths of from 50 feet to 125 feet were investigated for this plan. The existing armor stone along the first 600 feet at the southerly end of the study area would be maintained and redistributed to provide maximum protection for the steel sheet pile bulkhead in this area.

### First Cost

PLAN NO.	DESCRIPTION	QUANTITY	TOTAL FIRST COST <sup>1</sup>		FEDERAL SHARE FIRST COST		NON FEDERAL SHARE FIRST COST	
			OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
IA	2 Groins Sandfill with 50' berm	13,000 Tons 605,000 c.y.	\$3,367.6 <sup>2</sup>	\$7,693.8	\$1,683.8	\$3,846.9	\$1,683.8	\$3,846.9
IB	2 Groins Sandfill with 75' berm	14,000 Tons 709,000 c.y.	3,929.6	8,930.0	1,964.8	4,465.0	1,964.8	4,465.0
IC	2 Groins Sandfill with 100' berm	15,000 Tons 854,000 c.y.	4,617.6	10,798.2	2,308.8	5,399.1	2,308.8	5,399.1
ID	2 Groins Sandfill with 125' berm	16,000 Tons 981,000 c.y.	5,196.2	12,350.8	2,598.1	6,175.4	2,598.1	6,175.4

<sup>1</sup>The total first cost includes contingencies, engineering and design charges and supervision and administration costs.

<sup>2</sup>All costs are in \$1,000.

## Plan I

### Annual Charges

PLAN NO.	TOTAL FIRST COST <sup>1</sup>		INTEREST AND AMORTIZATION <sup>2</sup>		MAINTENANCE	TOTAL ANNUAL CHARGES	
	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFF SHORE SAND SOURCE	LAND BASED SAND SOURCE		OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
IA	\$3,367.6	\$7,693.8	\$225.0	\$513.7	\$59.5	\$284.5	\$573.2
IB	3,929.6	8,930.0	262.1	596.1	68.8	330.9	664.9
IC	4,617.6	10,798.2	308.6	721.0	82.7	391.3	803.7
ID	5,196.2	12,350.8	347.0	824.8	93.8	440.8	918.6

<sup>1</sup>All costs are in \$1,000

<sup>2</sup>Interest and amortization charges are figured on a project life of 50 years and a directed interest rate of 6 3/8%.

## Plan II

This plan involves the placement of sandfill without utilizing terminal groins along the entire 7,800 feet of the study area to an elevation of 16 feet above mean low water. As with Plan I, various beach berm widths ranging from 50 feet to 125 feet were investigated.

### First Cost

PLAN NO	DESCRIPTION	QUANTITY	TOTAL FIRST COST <sup>1</sup>		FEDERAL SHARE FIRST COST		NON FEDERAL SHARE FIRST COST	
			OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
IIA	Sandfill with 50' Berm	665,000 c.y.	\$3,157.4 <sup>2</sup>	\$7,922.2	\$1,578.7	\$3,961.1	\$1,578.7	\$3,961.1
IIB	Sandfill with 75' Berm	780,000 c.y.	3,669.8	9,292.4	1,834.9	4,646.2	1,834.9	4,646.2
IIC	Sandfill with 100' Berm	937,000 c.y.	4,341.0	11,162.8	2,170.5	5,581.4	2,170.5	5,581.4
IID	Sandfill with 125' Berm	1,075,000 c.y.	4,949.6	12,806.8	2,474.8	6,403.4	2,474.8	6,403.4

<sup>1</sup> The total first cost includes contingencies, engineering and design charges and supervision and administrative costs.

<sup>2</sup> All costs are in \$1,000.

### Annual Charges

PLAN NO	TOTAL FIRST COST <sup>1</sup>		INTEREST AND AMORTIZATION <sup>2</sup>		MAINTENANCE	TOTAL ANNUAL CHARGES	
	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE		OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
IIA	\$3,157.4	\$7,922.2	\$110.9	\$529.1	\$60.3	\$171.2	\$589.4
IIB	3,669.8	9,292.4	244.8	620.8	70.2	315.0	691.0
IIC	4,341.0	11,162.8	290.4	745.4	84.6	375.0	830.0
IID	4,949.6	12,086.8	330.8	854.8	97.2	428.0	952.0

<sup>1</sup> All costs are in \$1,000.

<sup>2</sup> Interest and amortization charges are figured on a project life of 50 years and a directed interest rate of 6 3/8%

### Plan III

This plan is the same as that described in Plan I with the addition of a series of eight low profile intermediate groins located at 800 foot interval between the two terminal groins.

#### First Cost

PLAN NO	DESCRIPTION	QUANTITY	TOTAL FIRST COST <sup>1</sup>		FEDERAL SHARE FIRST COST		NON FEDERAL SHARE FIRST COST	
			OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
III A	10 Groins Sandfill with 50' berm	76,000 tons 603,000 c.y.	\$5,708.0 <sup>2</sup>	\$10,019.8	\$2,854.0	\$5,009.9	\$2,854.0	\$5,009.9
III B	10 Groins Sandfill with 75' berm	82,350 tons 707,000 c.y.	6,404.2	11,490.2	3,202.1	5,745.1	3,202.1	5,745.1
III C	10 Groins Sandfill with 100' berm	88,720 tons 852,000 c.y.	7,283.8	13,450.0	3,641.9	6,725.0	3,641.9	6,725.0
III D	10 Groins Sandfill with 125' berm	95,080 tons 979,000 c.y.	8,058.0	15,199.4	4,029.0	7,599.7	4,029.0	7,599.7

<sup>1</sup>The total first cost includes contingencies, engineering and design charges and supervision and administrative costs.

<sup>2</sup>All costs are in \$1,000.

#### Annual Charges

PLAN NO.	TOTAL FIRST COST <sup>1</sup>		INTEREST AND AMORTIZATION <sup>2</sup>		MAINTENANCE	TOTAL ANNUAL CHARGES	
	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE		OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
III A	\$5,708.0	\$10,019.8	\$381.0	\$669.0	\$80.6	\$461.6	\$749.6
III B	6,404.2	11,490.2	427.7	767.3	92.7	520.4	860.0
III C	7,283.8	13,450.0	486.5	898.1	107.7	594.2	1,005.8
III D	8,058.0	15,199.4	537.8	1,015.0	121.5	659.3	1,136.5

<sup>1</sup>All costs are in \$1,000

<sup>2</sup>Interest and amortization charges are figured on a project life of 50 years and a directed interest rate of 6 3/8%.

## Plan IV

This plan involves the placement of rock revetment along the entire 7800 feet of the study area at the base of the steel sheet pile bulkhead and concrete wall. This revetment would have a top elevation of 15 feet above mean low water and a top width of  $12\frac{1}{2}$  feet.

### First Cost

Stone 56,612 Tons	\$1,759,100
Contingencies	<u>351,800</u>
Sub-total	2,110,900
Engineering & Design	<u>211,100</u>
Sub-total	2,322,000
Supervision & Administration	<u>209,000</u>
Total First Cost	\$2,531,000
Federal Share of Cost (50%)	\$1,265,500
Non Federal Share of Cost (50%)	\$1,265,500

### Annual Charges

#### Federal Investment

Interest and Amortization	\$84,500
( $0.06678 \times \$1,265,500$ )	
Total Federal Annual Charges	\$84,500

#### Non Federal Investment

Interest and Amortization	\$84,500
( $0.06678 \times \$1,265,000$ )	
Revetment Maintenance	<u>\$20,000</u>
(570 Tons @ \$35)	
Total Non Federal Annual Charges	\$104,500
Total Annual Charges	\$189,000

TABLE A-2

SUMMARY OF FIRST COSTS AND ANNUAL CHARGES<sup>1</sup>**North Beach**

PLAN NO.	FEDERAL SHARE FIRST COST		NON FEDERAL SHARE FIRST COST		TOTAL FIRST COST		FEDERAL SHARE ANNUAL CHARGES		NON FEDERAL SHARE ANNUAL CHARGES		TOTAL ANNUAL CHARGES	
	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE	OFFSHORE SAND SOURCE	LAND BASED SAND SOURCE
IA	\$1,683.8	\$3,846.9	\$1,683.8	\$3,846.9	\$3,367.6	\$7,693.8	\$140.0	\$284.3	\$144.5	\$288.9	\$284.5	\$573.2
IB	1,964.8	4,465.0	1,964.8	4,465.0	3,929.6	8,930.0	163.0	330.0	167.9	334.9	330.9	664.9
IC	2,308.8	5,399.1	2,308.8	5,399.1	4,617.6	10,798.2	193.0	399.2	198.3	404.5	391.3	803.7
ID	2,598.1	6,175.4	2,598.1	6,175.4	5,196.2	12,350.8	217.6	456.5	223.2	462.1	440.8	918.6
IIA	1,578.7	3,961.1	1,578.7	3,961.1	3,157.4	7,922.2	135.6	294.7	135.6	294.7	171.2	589.4
IIB	1,834.9	4,646.2	1,834.9	4,646.2	3,669.8	9,292.4	157.5	345.5	157.5	345.5	315.0	691.0
IIC	2,170.5	5,581.4	2,170.5	5,581.4	4,341.0	11,162.8	187.5	415.0	187.5	415.0	375.0	830.0
IID	2,474.8	6,403.4	2,474.8	6,403.4	4,949.6	12,806.8	214.0	476.0	214.0	476.0	428.0	952.0
IIIA	2,854.0	5,009.9	2,854.0	5,009.9	5,708.0	10,019.8	215.5	361.5	242.1	388.1	461.6	749.6
IIIB	3,202.1	5,745.1	3,202.1	5,745.1	6,404.2	11,490.2	245.8	415.6	274.6	444.4	520.4	860.0
IIIC	3,641.9	6,725.0	3,641.9	6,725.0	7,283.8	13,450.0	281.5	487.3	312.7	518.5	594.2	1,005.8
IIID	4,029.0	7,599.7	4,029.0	7,599.7	8,058.0	15,199.4	313.0	551.6	346.3	584.9	659.3	1,136.5
IV	1,265.0		1,265.0		2,531.0		84.5		104.5		189.0	

**Foss Beach**

I	302.15		302.15		604.3		20.2		24.4		44.6	
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<sup>1</sup>All Costs are in \$1,000.

# **SECTION 3**

**ESTIMATE OF BENEFITS**

# ESTIMATE OF BENEFITS

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## SECTION 3

# ESTIMATE OF BENEFITS

### General

1. An estimate of all the benefits which may be expected to accrue from each of the alternative plans of improvement was made for each of the beach areas. Only those tangible benefits to which a monetary value could be assigned were included. It should be kept in mind that other intangible benefits such as increasing the desirability of the beach area, increasing the property values and enhancing the social well-being of the people in the area would also be realized if these plans are constructed. A directed interest rate of 6 3/8% and a project life of 50 years was used in calculating the benefits.

### North Beach

2. At North Beach the primary benefits to be derived from an improvement project would be based on (1) the reduction in the cost of maintenance to the highway, concrete seawall, steel sheet pile bulkhead, backshore residences and structures; (2) and the encouragement of the healthful recreation of the populace by protection and improvement of the dry beach area. No recreational benefits can be taken for the protection plan involving the stone revetment since no recreational beach area is being created.

### Reduction of Maintenance and Repair Costs

3. The State of New Hampshire has expended a great deal of effort and money on the construction and maintenance of protective structures at North Beach. In addition, a large amount of money has been expended annually by the state for the repair and maintenance

of the backshore highway, on the landward side of the steel sheet pile bulkhead and concrete sea wall. State officials have reported that the cost of cleanup of sand, rocks and other debris from the highway and repairs to the concrete seawall and steel sheet pile bulkhead has amounted to about fifty thousand dollars annually, at North Beach. It has been estimated that if any of the considered plans of improvement were implemented the annual maintenance charges would be reduced by eighty percent. This would result in an annual net savings of forty thousands dollars.

4. During severe storm conditions waves break on and overtop the seawall and bulkhead. These events have caused flooding and other damages to the backshore structures, as well as the coastal highway. It has been estimated that individual property owners on the west side of the highway are required to spend an average of two hundred dollars a year repairing the storm damages which occur to the structures and removing debris from around the buildings. About fifty structures are affected, resulting in a total annual cost of ten thousand dollars. It is reasonable to assume that if any of the considered plans of protection were constructed approximately eighty percent of these annual repair costs would be eliminated, resulting in an annual savings of eight thousand dollars.

## **Recreation Benefits**

5. North Beach is a publicly owned beach, located just north of the popular recreational beach area of Hampton Beach. Hampton Beach is heavily commercialized with a large number of concession stands, amusements, restaurants, motels, gift shops and other facilities which cater to the tourist trade. In addition, Hampton Beach is well developed and offers a wide range of recreational opportunities.

6. North Beach, on the other hand, is more residential in nature and has only a couple of restaurants and concession stands with a limited number of motels. The beach is in poor physical condition and incompletely developed, with only the minimum amount of basic facilities for safety and comfort. There is no bathhouse or nurse's station, but there is a public rest room at the north end of the beach. Life guards are on duty during the beach season. Currently, there is no major parking facility at the beach but state metered diagonal parking is available along the backshore roadway. North Beach is not attractive to the day tripper or vacationer who desires the accessories which accompany Hampton Beach. North Beach is an ancillary facility used by some of the overflow crowds from Hampton Beach during peak days and by the local residents who want to enjoy the pleasures of the beach and the ocean without having to contend with large crowds.

7. At North Beach, as is the case with other beach areas, the recreational benefits derived from a beach erosion control project are proportional to the amount of new recreational beach area provided. Plans I, II and III all provide for various amounts of additional recreational beach area. Plan IV does not provide for any additional recreational beach area. The portion of North Beach under study in this report covers a distance of 7800 feet starting at Great Boars Head on the south and extending northward to the site of the former Coast Guard station. At the time of this survey which was done in April of 1973 there was approximately 162,885 square feet of usable dry beach area above the mean high waterline in the study area. Using a factor of 75 square feet per bather this would permit 2,172 people to utilize the beach at any given time. Due to the recreational nature of the area, it has been assumed that a turnover rate of 2 for beach use may occur during peak weekend or holidays. Therefore the maximum daily capacity the existing beach

could accommodate satisfactorily would be 4344 people. If any of the first three considered plans are implemented anywhere from 1,146,075 for Plan I A to 1,781,655 square feet for Plan II D of additional dry beach area, above the mean high waterline, will be provided. Assuming a turnover rate of two, this would correspond to an additional capacity of from 30,562 to 47,510 people.

8. It has been estimated that there are approximately 2900 potential beach users within a half mile walking distance of North Beach. There are almost 900 parking spaces available in the North Beach area, including both metered parking along Ocean Boulevard and nearby unrestricted street parking. Assuming a representative figure of 3.5 people per car, the present parking facilities can accommodate an additional 3150 potential beach users. On a peak weekend or holiday as many as 6050 people may desire to use the beach which only has an existing comfortable capacity for 4344 people. The existing beach is able to comfortably accommodate only two thirds of the potential peak day usage.

9. The average length of the recreational beach season along the New Hampshire coastline is considered to extend from the last week in June through Labor Day which amounts to about 78 days. Assuming that this total will be reduced by about 25 percent for adverse weather conditions, the average number of seasonal beach user days has been taken as 58. Due to the fact that the beach area is not fully developed, it was assumed that a beach user fee of \$0.80 per person was a reasonable figure to use in establishing the recreational beach benefits. The below listed assumptions were made in establishing the recreational benefits for Plans I, II and III.

a. After the project is constructed, beach demand will continue to increase from its present peak level of 6050 people in a straight line fashion until it equals the supply. The demand will remain constant at this upper limit for the remainder of the project life.

The point of time in the future at which the supply was assumed to equal the demand was adjusted to reflect the magnitude of the plan being considered. Figure 1 gives a graphic representation of this assumption for Plan II B for a peak weekend or holiday. Similar graphs were used for developing the weekday benefits for Plan II B as well as all other beach plans.

b. The required amount of parking would be made available by the non-Federal interests as the demand increased. Assuming a turnover rate of 1.5 per parking space, this would mean from 2400 to 4000 additional parking spaces would be needed to accommodate the crowds on peak days, depending on the magnitude of the project constructed.

c. Sufficient access roads will be available to accommodate the anticipated volume of traffic into and out of the area without causing undo congestion.

d. The required public bathhouses, sanitary and other concomitant facilities would be provided.

10. The recreational benefits for Plans I, II and III were developed using economic discounting formulae in conjunction with the appropriate supply-demand curves similar to the ones shown in Figure 1. Table 3-1 gives a list of the recreational beach benefits, as well as, a summary of all benefits associated with all the considered plans of protection for North Beach.

11. It should be emphasized that the recreational benefits that were developed for the proposed projects are heavily dependent on the assumptions that adequate parking, access roads, bathhouses, sanitary

and other concomitant facilities would be provided by the non-Federal interests as needed. All land on the west side of the roadway, behind the existing developed strip of houses, is salt water marshland. Based on this fact, it does not appear that there is any suitable land available in the immediate backshore area to accommodate the above mentioned items without adversely affecting the salt water marsh area. In addition, the permanent and seasonal residents in the North Beach area have indicated that they are opposed to anything which would drastically change the existing character of the area. It appears that a large portion of the recreational benefits associated with the beach projects may not be realized due to the environmental and physical constraints in the area. If the constraints are incorporated into the projected demand figures, the figures may be reduced by as much as one-half to three-quarters of those utilized. This would result in a reduction of the benefits to such a point that none of the proposed plans would be economically justified.

FIGURE I  
NORTH BEACH-PLAN IIB-75' BEACH BERM  
SUPPLY-DEMAND CURVES FOR A PEAK DAY

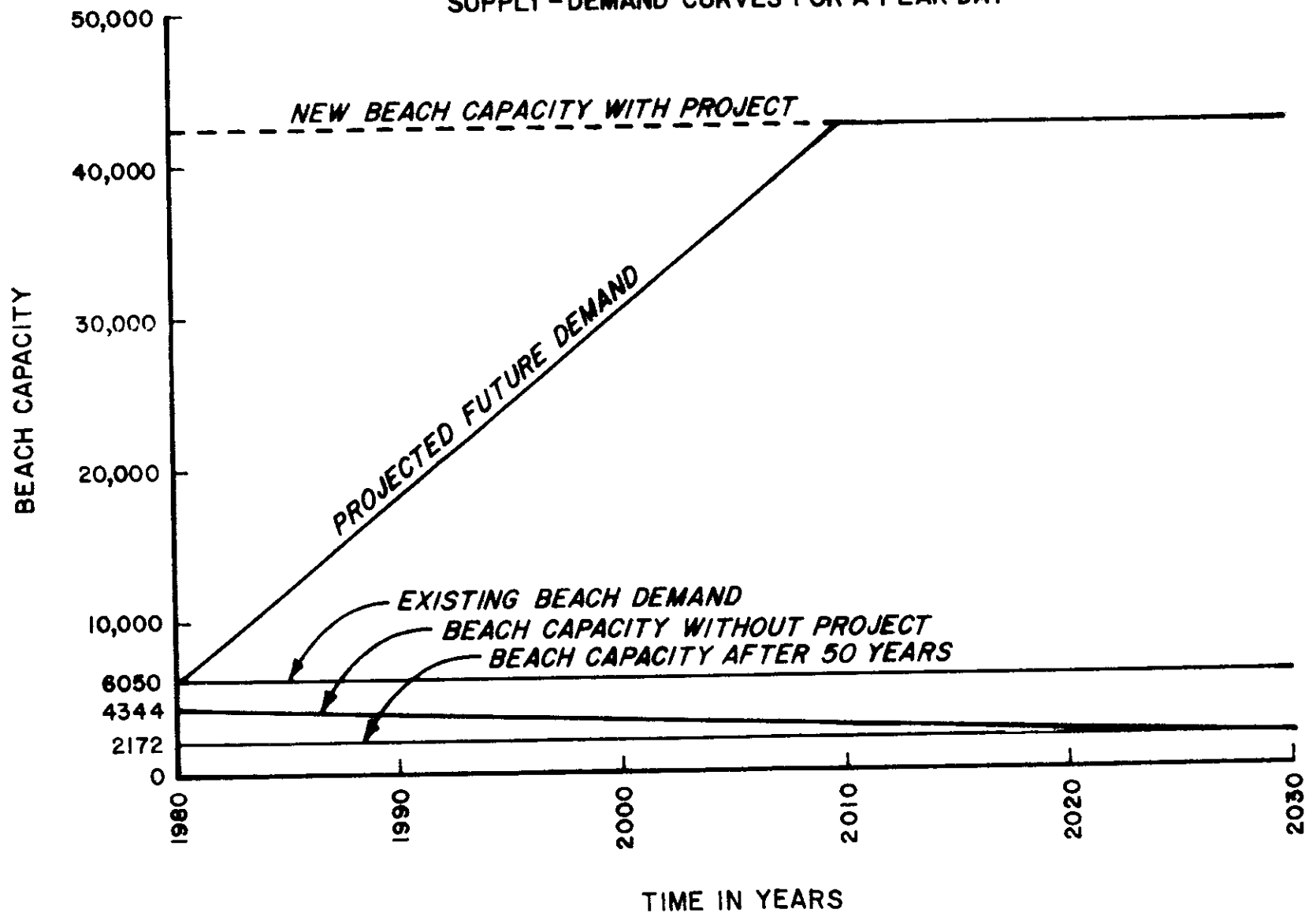


TABLE 3-1

SUMMARY OF ANNUAL BENEFITS FOR NORTH BEACH

<u>Plan No.</u>	<u>Description</u>	<u>Recreation Benefits</u>	<u>Reduction in Maintenance to High- way, Protective Struc- tures and Residences</u>	<u>Total Annual Benefits</u>
IA	7200' Sandfill, terminal groins and 50' berm width	\$516,000	\$48,000	\$564,000
IB	7200' Sandfill, terminal groins and 75' berm width	545,000	48,000	593,000
IC	7200' Sandfill, terminal groins and 100' berm width	591,000	48,000	639,000
ID	7200' Sandfill, terminal groins and 125' berm width	634,000	48,000	682,000
IIA	7800' of Sandfill with a 50' berm width	534,000	48,000	582,000
IIB	7800' of Sandfill with a 75' berm width	580,000	48,000	628,000
IIC	7800' of Sandfill with a 100' berm width	624,000	48,000	672,000
IID	7800' of Sandfill with a 125' berm width	666,000	48,000	714,000
IIIA	7200' of Sandfill, terminal and intermediate groins and 50' berm width	516,000	48,000	564,000
IIIB	7200' Sandfill, terminal and intermediate groins and 75' berm width	545,000	48,000	593,000
IIIC	7200' Sandfill, terminal and intermediate groins and a 100' berm width	591,000	48,000	639,000
IIID	7200' Sandfill, terminal and intermediate groins and a 125' berm width	634,000	48,000	682,000
IV	7800' of Rock Revetment	-	48,000	48,000

## **Foss Beach**

12. At Foss Beach it would be very difficult to maintain an artificially placed sandfill beach due to the wave climate and exposure. In addition, it was found that a number of physical and environmental constraints in the area dictated against being able to realize a large amount of recreational benefits from a sandfill project. Based on these facts, it was determined that a sandfill beach project at Foss Beach could not be economically justified. Another form of protection involving the creation of a stone mound along the entire back shore area was evaluated. This structure would provide adequate protection to the backshore roadway and structures and would be cheaper to construct and maintain than a sandfill project. No additional recreational beach area would be created by this plan of protection, and therefore no recreational benefits can be attributed to it.

## **Reduction of Maintenance and Repair Costs**

13. The primary benefits which can be attributed to the stone mound protection plan are the reduction or elimination of repairs to the highway and minor repairs to the private structures on the west side of the roadway. It has been estimated that the cost of these repairs averages about \$5,000 annually. The stone mound would probably reduce these annual costs by about eighty-five percent resulting in an annual benefit of \$4,250.

## **Summary of Economic Analysis**

14. A summary of the economic analysis for the various considered plans of protection for North Beach based on obtaining the required

sandfill from an offshore site is shown in Table 3-3. Table 3-4 shows a similar summary based on obtaining the sandfill from a land based pit. Table 3-2 shows a summary of the economics associated with the considered plan of protection for Foss Beach.

Table 3-2

SUMMARY OF ECONOMIC ANALYSIS FOR FOSS BEACH

Description: 4,000 foot long stone mound

Annual Charges: \$44,600

Annual Benefits: \$4,250

Benefit-to-Cost Ratio: 0.10

Excess of Benefits Over Costs: -\$40,350

15. As seen from Table 3-3, all of the plans which include sandfill for North Beach have a benefit-to-cost ratio in excess of 1.0 indicating there is economic justification for construction of these projects. Plan IIA has the highest benefit-to-cost ratio (2.15) of all the plans. Plan IIB provides the best maximization of net benefits by having the largest excess of benefits over costs. Plan IV does not show economic justification. However, it should be emphasized that figures shown in Table 3-3 are based on the assumption that sand will be obtained from a relatively cheap offshore source and the further assumption that there are no constraints to prevent the beach from being utilized to its full capacity.

16. Table 3-4 reflects what happens if a land based source of sand is utilized for the plans which include sandfill. The benefits are the same as those shown in Table 3-2. As seen from the table none of the sandfill plans have a benefit-to-cost ratio of 1.0 or greater which indicates that they are not economically justified. The figures for Plan IV are the same as those shown in Table 3-3.

17. Table 3-2 for Foss Beach shows that the stone mound protection plan has a very low benefit-to-cost ratio of 0.10 indicating no economic justification for its construction at this time.

TABLE 3-3

SUMMARY OF ECONOMIC ANALYSIS FOR NORTH BEACH

Plan No.	Description	Annual <sup>1</sup>	Annual	Benefit	Excess <sup>2</sup>
		Charges	Benefits	Cost Ratio	Benefits Over Costs
IA	7200' of Sandfill, terminal groins & 50' berm width	\$284,500	\$564,000	1.98	\$279,500
IB	7200' of Sandfill, terminal groins & 75' berm width	330,900	593,000	1.79	262,100
IC	7200' of Sandfill, terminal groins & 100' berm width	391,300	639,000	1.63	247,700
ID	7200' of Sandfill, terminal groins & 125' berm width	440,800	682,000	1.55	241,200
IIA	7800' of Sandfill with a 50' berm width	271,200	582,000	2.15	310,800
IIB	7800' of Sandfill with a 75' berm width	315,000	628,000	1.99	313,000
IIC	7800' of Sandfill with a 100' berm width	375,000	672,000	1.79	297,000
IID	7800' of Sandfill with a 125' berm width	428,000	714,000	1.67	286,000
IIIA	7200' of Sandfill, terminal and intermediate groins and 50' berm width	457,600	564,000	1.23	106,400
IIIB	7200' of Sandfill, terminal and intermediate groins and 75' berm width	520,400	593,000	1.14	72,600
IIIC	7200' of Sandfill, terminal & intermediate groins and 100' berm width	594,100	639,000	1.07	44,900
IIID	7200' of Sandfill, terminal & intermediate groins and 125' berm width	659,300	682,000	1.03	22,700
IV	7800' of Rock Revetment	189,000	48,000	0.25	-141,000

<sup>1</sup>The annual charges for Plans I, II and III are based on obtaining the required sandfill offshore at the entrance to Newburyport Harbor, Massachusetts

<sup>2</sup>Minus figures indicate that the annual charges exceed the annual benefits.

TABLE 3-4

SUMMARY OF ECONOMIC ANALYSIS FOR NORTH BEACH

<u>Plan No.</u>	<u>Description</u>	<u>Annual<sup>1</sup> Charges</u>	<u>Annual Benefits</u>	<u>Benefit Cost Ratio</u>	<u>Excess<sup>2</sup> Benefits Over Costs</u>
IA	7200' of Sandfill, terminal groins and 50' berm width	\$573,200	\$564,000	0.98	\$ -9,200
IB	7200' of Sandfill, terminal groins and 75' berm width	644,700	593,000	0.92	-51,700
IC	7200' of Sandfill, terminal groins and 100' berm width	803,700	639,000	0.80	-164,700
ID	7200' of Sandfill, terminal groins and 125' berm width	918,600	682,000	0.74	-236,600
IIA	7800' of Sandfill, with a 50' berm width	589,400	582,000	0.99	-7,400
IIB	7800' of Sandfill with a 75' berm width	691,000	628,000	0.91	-63,000
IIC	7800' of Sandfill with a 100' berm width	830,000	672,000	0.81	-158,000
IID	7800' of Sandfill with a 125' berm width	952,000	714,000	0.75	-238,000
IIIA	7200' of Sandfill, terminal and intermediate groins and a 50' berm width	749,600	564,000	0.75	-185,600
IIIB	7200' of Sandfill, terminal and intermediate groins and 75' berm width	860,000	593,000	0.69	-267,000
IIIC	7200' of Sandfill, terminal and intermediate groins and 100' berm width	1,005,800	639,000	0.64	-366,800
IIID	7200' of Sandfill, terminal and intermediate groins and 125' berm width	1,136,500	682,000	0.60	-454,500
IV	7800' of Rock Revetment	189,000	48,000	0.25	0141,000

<sup>1</sup>The annual charges for Plan I, II and III are based on obtaining the required sandfill from a land based source at Ossipee, New Hampshire

<sup>2</sup>Minus figures indicate that the annual charges exceed the annual benefits.

**NORTH BEACH - TOWN OF HAMPTON  
AND  
FOSS BEACH - TOWN OF RYE  
NEW HAMPSHIRE  
BEACH EROSION CONTROL  
FEASIBILITY REPORT**

**PERTINENT  
CORRESPONDENCE**

**PREPARED BY THE  
NEW ENGLAND DIVISION  
CORPS OF ENGINEERS  
DEPARTMENT OF THE ARMY**

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# PERTINENT CORRESPONDENCE

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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE

Concord Field Office  
P. O. Box 1518  
55 Pleasant Street  
Concord, NH 03301

March 9, 1977

Division Engineer  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

ATTN: Coastal Development Branch

Dear Sir:

This planning aid letter concerns your plans for beach erosion control for the shores of the State of New Hampshire at North Beach, Town of Hampton, and Foss Beach, Town of Rye. The purpose of the study is to determine the economic, environmental, and technical feasibility of providing shore protection and restoration measures for these two areas.

We understand the plan being considered for Foss Beach involves the placement of dumped riprap on the existing shingle beach ridge. The top elevation of the stone mound would be at a height of 19 feet above mean low water to prevent damaging overtopping. Briefly, the alternative plans developed for North Beach include: (1) sand fill between two terminal groins with beach berm widths of 50, 75, 100, or 125 feet; (2) sand fill without groins with beach berm widths of 50, 75, 100, or 125 feet; (3) sand fill between two terminal groins plus eight intermediate groins with beach berm widths of 50, 75, 100, or 125 feet; and (4) rock revetment along the seaward side of the seawall for the length of the study area. Potential sources of sand fill are a large sand bar at the mouth of the Merrimack River in Newburyport, Massachusetts, and a commercially operated sand pit in Ossipee, New Hampshire.

We understand that under present regulations, the beach can only be restored and protected, not restored and improved. This means the beach can be restored to what it was in the past but not extended further seaward. Initial sand fill at North Beach is not anticipated to cover benthic organisms beyond the limits of the former beach. After the sand fill is placed in the area, natural hydrologic forces will probably start to move the sand. Slumping and drifting sand could cause significant losses of benthic organisms by overspreading them. It appears that alternative plan 3 would result in the least amount of sand movement after installation and thus minimize detrimental



Appendix B

environmental effects. This alternative would also provide the maximum potential amount of fisherman access on the groins. In addition, this plan, with a beach berm of 50 feet, would cover the least amount of benthic habitat while still providing a recreational beach and fisherman access along the protective structures. Therefore, this alternative appears to be the most favorable environmentally of those which provide for beach restoration at North Beach.

The placement of the stone mound on Foss Beach does not appear to have serious environmental impacts.

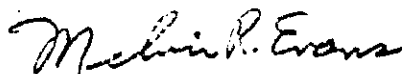
The environmental problems associated with locating a suitable sand source and providing parking facilities for beach users are critical. As stated in our preliminary report of August 22, 1972, "In general, we feel that sand and gravel dredging in offshore areas is more detrimental to the environment than utilizing land sources." Complete environmental impact studies of possible borrow areas will be necessary to determine which possible alternative would have the least impact on fish and wildlife resources. It may be possible to locate an offshore source of suitable sand that would not result in undue environmental losses.

Providing parking facilities for the thousands of visitors expected at North Beach may not be compatible with the environment. We will oppose any alternatives which include filling wetlands to provide parking and other facilities near North and Foss Beaches.

We appreciate the opportunity to provide this planning aid letter at this stage in project development. Please advise us if a final plan is decided upon. We will then provide a detailed conservation and development report.

Please keep us advised of the progress of your study.

Sincerely yours,



Melvin R. Evans  
Field Supervisor, CFO



# TOWN OF HAMPTON, NEW HAMPSHIRE 03842

TOWN HALL, 136 Winnacunnet Road

March 7, 1977

From the Office of: Hampton Planning Board

Division Engineer  
U. S. Army Corp of Engineers  
Trapello Road  
Waltham, Massachusetts 02154

Dear Sir:

Your office has been in the process of reviewing a study for a proposed erosion control project at North Beach, Hampton, New Hampshire.

Persuant to your study the Hampton Planning Board and the Hampton Board of Selectmen held a public hearing on July 21, 1976 at which the opinions of interested citizens were sought concerning your proposals. The hearing was very well attended with upwards to 300 persons in attendance and it was the overwhelming sentiment of those present that nothing be done which would further increase the attractiveness of that area for vacation purposes.

I enclose for your information a copy of the minutes of that public hearing so that you may better understand the feelings of the persons present and hope that this local input will have some bearing on any further planning you may do on this project.

Very truly yours,

A handwritten signature in cursive script, reading "Louisa K. Woodman".

Louisa K. Woodman, Chairman  
Hampton Planning Board

LKW/hc

cc: Board of Selectmen

Appendix B



# TOWN OF HAMPTON, NEW HAMPSHIRE 03842

TOWN HALL, 136 Winnacunnet Road

June 24, 1976

From the Office of: Hampton Planning Board

## PUBLIC HEARING

The Hampton Board of Selectmen and the Hampton Planning Board will hold a public hearing on Wednesday, July 21, 1976 to hear from the townspeople concerning proposals to control erosion in the North Beach area.

The hearing will be held at the Hampton Academy Junior High School Cafetorium beginning at 7:30 p.m. and all interested residents of the community are welcome to attend to express their views. The U. S. Corp of Engineers is proposing one of four alternative plans as a possible means to control erosion in an area beginning at the North side of Great Boars Head and going North to approximately High Street. If completed, the project will bring substantial change to the community. The Board of Selectmen and Planning Board are asking for public input in order to better advise the Corp of Engineers as to the community's sentiments on the project.

Signed,

A handwritten signature in cursive script, reading "Louisa K. Woodman".

Louisa K. Woodman, Chairman  
Hampton Planning Board

Appendix B

TOWN OF HAMPTON  
BOARD OF SELECTMEN AND PLANNING BOARD  
Hampton, New Hampshire

PUBLIC HEARING  
BEACH EROSION CONTROL STUDY  
North Beach, Town of Hampton, N. H.

Hampton Academy Junior High Cafetorium  
July 21, 1976 - 7:30 p.m.

Appendix B

Board of Selectmen

James F. Fallon, Chairman  
Robert V. Lessard  
Francis H. Fitzgerald  
Helen W. Hayden  
Clifford H. Eastman, Sr.

Planning Board

Louisa K. Woodman, Chairman  
Donald D. Surprenant  
Samuel A. Towle  
Ashton J. Norton

Mrs. Woodman: Let us begin this public hearing at 7:30 p.m. I regret that the Chairman of the Board of Selectmen is not here yet but we expect him at any moment. I am the Chairman of the Planning Board. I will begin by introducing the members of the Board to you (introductions made). If there are any questions that you would like to direct to a specific individual, you will know to whom you are speaking. Mr. Fallon has agreed to be the Chairman of this joint hearing of the Board of Selectmen and Planning Board.

Mr. Fallon: Ladies and Gentlemen, as Mrs. Woodman has probably told you, this is a public hearing on a proposal for the development of the North Beach area that has been submitted by the Army Corp of Engineers with certain conditions that they would require to consider this proposal further. This public hearing, called as a joint meeting of the Board of Selectmen and Planning Board, is to present whatever information we can and, above all, to hear your questions and comments and try to answer them. Are there people here who are familiar with this plan who would be able to answer specific questions?

Mrs. Woodman: Those members of the Planning Board and Board of Selectmen who attended the meeting in Concord on this preliminary proposal would best be able to answer questions.

Mr. Fallon: About the only recommendation I would state is to ask anyone who wishes to speak to use the microphone and begin by giving your name, even though we might know who you are, so that the secretary will have that information for the minutes. Without anything further, I will turn this over to Louisa Woodman to give you a general outline of what we are talking about. Are there any questions?

Mr. Henry Dumaine, 183 Kings Highway: Is this just for town residents to comment on?

Mr. Fallon: Not necessarily. Anyone who has an interest in this matter, we would be happy to listen to.

Mrs. Woodman: I am sure you can all see the aerial photos of the Town of Hampton. First, let me give you a little background on this project. In 1969 and 1970 the Congress of the United States in a Congressional resolution requested the U. S. Army Corp of Engineers to come up with methods to control erosion in two locations in New Hampshire; Foss Beach in Rye and North Beach in Hampton. By North Beach I am referring to the area North of Boars Head to just

South of Plaisance Cove. In response to this Congressional resolution the Corp of Engineers began a study and in 1972 they held a public hearing in Rye. Last winter, Town of Hampton officials were requested to come to Concord to discuss the preliminary study developed by the Corp of Engineers for erosion control at North Beach. At this point, the Corp had rejected any plan at Foss Beach. That is not part of the study at the present time. The Corp of Engineers have presented four plans. One would merely control erosion and at the same time destroy what beach there is now by the placing of a rock revetment along the entire from Boars Head to Bicentennial Park. The revetment is a groin parallel to the ground as opposed to one that would come out in the water. A groin, in this sense, is mainly a structure of granite rock. A berme is a bump and a revetment is a mound. These are words that we will be using in describing all of these plans. One plan calls for a revetment. It would stop erosion but would also stop the recreational use of the beach. The other three plans call for the construction of groins 850 feet out in the ocean and placement of sand 125 feet in width at high tide. The Corp is interested in the protection of this property. I am sure you are all aware that during storms with repeated high waves, that there is a danger to all of the property in this area. Three of the plans that the Corp is talking about would control erosion and create a sandy beach but also a new recreational facility. There would have to be a commitment on the part of the State and the community to see that adequate roads to the new beach and adequate parking for the people and facilities for sanitary use would be available. None are currently available. The major access to Hampton Beach is the Hampton-Exeter Expressway and that brings traffic out on Route 1A in the main beach area. That is not adequate to service this area. There is no parking sufficient for the current time. There are land areas that are not marsh that could be used by the Town taking them in one manner or the other. By that I mean by outright purchase because that is the way the Town of Hampton does things. As far as sanitary facilities, these would have to be provided for. From the junction of Winnacunnet Road, this whole area is zoned Residential B but has been decreed by the Board of Selectmen to have the restrictions of Residential A. Also it should be recognized that the State owns the beach roadway. The Town owns the land from Winnacunnet Road up in the numbered street area and effectively controls what is placed on that land. The Board of Selectmen and Planning Board were asked to tell the Corp of Engineers what their suggestions were. Their decision was not to unilaterally give a decision but to ask the people to give their ideas before we formulate a decision of the Boards. The Planning Board and Board of Selectmen will jointly send a letter to the Corp of Engineers after this meeting that we are holding tonight with our recommendation and hopefully will give the sentiments of those people here tonight.

Mr. Fallon: Does anyone else on the Board wish to add something in addition to what has been presented?

Mrs. Woodman: I did not talk about funding. There are price tags on everything. The Corp has indicated that as an erosion project that the Federal government would pay one-half the cost of

whatever plan was agreed on that would be the right plan. The other half would be paid by the State and the Town. No formula has been determined but I would stress that the State owns the beach. The State or the Town would be responsible for any road, parking, sanitary facilities, etc. There are possibly other Federal funds that could be drawn on to offset the cost but at this point cost is not the major point; it is the will of the people. If the people do not want the project, it is pointless to talk about cost.

Mr. Howard Page, 2 Dover Avenue: I have a vested interest in 199 Ocean Blvd. I would like to know where the parking would be; if it is to be on the Boulevard; if it would take domain over what is there now, or if it would be on the marsh area? We do not have enough information yet.

Mr. Fallon: There has been no decision made yet as to the areas of parking. Mr. Fitzgerald, would you be willing to comment on the areas that have been discussed?

Mr. Fitzgerald: There is an area to the west of Kings Highway that was filled just recently. That land I feel along with some members of the Board, could be obtained for parking. There is approximately two acres. As an added attraction to this, if purchased for parking, it could be double decked. Off-beach parking has also been discussed. There is land basically that the town now owns in the dump area that could be used with shuttle bus service. Again, the comment was made who is going to do it. Again, that is why we are here. You, the taxpayers, will foot the bill whether it is the State or the Town that does it.

Mr. Howard Page: There are many folks who live along this entire area who are retired folks. I hope to retire up here myself. This is a residential section. It has been banned from commercialism. I do not want to see restaurants, cocktail lounges, arcades, mopeds, on Ocean Blvd. North. I have lived on Hampton Beach for 40 years. Within two blocks of me there are six places to buy liquor. This next year I am going to underwrite to vote Hampton dry again. I think we have had enough of it. I hope to retire on North Shore and when I do I hope there will not be too much more than there is now.

Mr. George Pappademas: I would like at this time to question the distinguished panel. How can you expect us to comment on this when we have not been given the plans? I, personally, I am ignorant as to what it is all about.

Mr. Fallon: I will see if I can clarify it. We are not making this proposal. We have received from the Corp of Engineers their proposal as to alternatives that might be undertaken and the conditions under which they might undertake them. We, the Selectmen and Planning Board, are asking questions in a very general format. It does indeed contemplate making much more of a commercial beach if any one of these plans is undertaken. What we want is the feeling of the citizens in our asking the Corp of Engineers to go ahead on the

condition that it becomes accessible to many more people.

Mr. George Pappademas: I do not know whether you are keeping us in the dark but it has been so general that it is very unfair if you expect us to comment if you have not explained what it means. Show us what we are going to need; police protection, fire, roads, parking...

Mr. Fallon: We have not undertaken the type of study you are asking for. If there is no need to undertake it, why should we go to this expense?

Mrs. Woodman: I deeply regret that there are not more handout sheets. I did make 125 copies. In the general comments that I composed I stressed something and that is that this project is in the very preliminary stages. I would like to stress two other things. The Corp of Engineers can come in and do one of these projects whether we want them to or not. If, at a very early stage, we say 'No' they are apt to direct their efforts towards something more easily received. If we convey to the Corp that at a meeting attended by some 300 to 400 people that their was precious little sentiment for this proposal, they are likely to put it on the back burner for many years. It still can come out. The reason I stress that is because this area is very susceptible to erosion. Our State does not properly maintain the seawall and it becomes weaker and weaker. This area is subject to the threat of the ocean with every major storm.

Mr. George Pappademas: Then you are putting the cart before the horse. Speaking very generally, this could be very unfair. If it is good for the town, then everyone wants it and if it is not, then we should all be against it. This Board has not prepared themselves properly so we can look and evaluate all of the possibilities with dignity...

Mr. Fallon: Once more, we are not proposing this. We are here to answer what questions that can be answered and to hear your comments.

Mrs. Ednapearl Parr: I am very concerned about erosion in this area. Everyone in this room is well aware that the seawall is inadequate and has washed out many times. Plaice Cove almost washed away two or three years ago. Is it possible that the Corp could build a groin out into that area to protect that part of the seawall?

Mrs. Woodman: As I said, there are four plans. A groin perpendicular to the shore will not stop the wall from being breached. The plan that is the simplest calls for large granite blocks against the seawall. Those would be at a top width of  $12\frac{1}{2}$  feet and slope  $1\frac{1}{2}$  feet horizontal to 1 foot vertical. This would mean that there would be a revetment 18 feet out into the existing sand. That is the minimum protection that the Corp feels would control erosion. Another plan calls for replacing the stone and filling with sand. It was felt that this would be totally inadequate. Another plans calls for the construction of two groins; one about 600 feet north of Boars Head and one in the vicinity of High Street and the placement of sand in that

area. All of these are after construction of a revetment. The plan that has the most chance is the plan that calls for two 800-foot groins and alternate groins located at different intervals between the two terminal groins to hold the sand from shifting. Under this proposal the Corp would maintain the beach and on a continuing basis undertake a replenishment program. I am sure everyone is aware that the tides in Hampton are north and south. The sand does not go out. It goes down towards Hampton River. If, in fact, this beach were constructed they would undertake the same type of beach replenishment that it currently undertakes on other beaches in New Hampshire. Likely, the Hampton River would be dredged more frequently. This is a side benefit. Also, they have not said where the stone is coming from and where the sand is coming from. What we are doing is saying 'How would you like a beach?' If you would like one, tell us and if you would not like one, tell us. We can give you more specific information but I don't think you want that now.

Mr. Fallon: Several members of the Board have suggested that I remind those present that the reason those proposals were made is that persons who were concerned about erosion in this area went to their representatives and asked that something be done.

Mr. Gus Anderson: The Corp has neglected that part of the beach for the past three or four years. They had a jetty and that locked that sand about twelve to fourteen feet up. If you look at the beach today, there is no stone from Winnacunnet Road down to 3rd St. My recommendation is that we should accept plan #4 where there is a jetty going out. Today, you take in front of 5th, 6th, 7th, 8th streets you can't get to the beach until you go over 15 feet of stone so it would not make too much difference.

Mr. Robert Wilson: I just have a question about what I read in the paper. It is my understanding that the Corp would make no move unless the State and Town build a road and parking facilities for the increased traffic. You, Louisa Woodman, said that they could go ahead.

Mr. Fallon: There is a big distinction between what they could do and what they would do.

Mr. Robert Wilson: If the parking is not considered, they would leave things as they are?

Mr. Fallon: Presumably so. They have the authority to do it. They are not willing to provide the beach unless they have a much larger crowd that uses it than there is now.

Mr. Robert Wilson: Am I to believe that the U. S. Senate said to the Corp of Engineers to go ahead with this project. There has got to be some instigating source. The Corp does not go around looking for work.

Mr. Fallon: The Federal Beach Erosion Control Study was authorized by resolution of the U. S. Senate and House Committee

on Public Works. These resolutions were introduced by the State delegates at the request of local residents.

Mr. Robert Wilson: You are talking about a road; I guess that would be across the salt marsh. The marsh is kind of sacred ground to a lot of people. It could be put on pilings...

Mr. Fitzgerald: The Hampton-Exeter Expressway is presently two lanes and there is land that it could go to four lanes. Back many years there was a study showing to bypass the beach from the Underwood Bridge to Boars Head and then High Street. It could be skirted along the marsh by the Eel Ditch in order to bridge traffic from the X-Way to North Beach. There was also a northern route from Lafayette Road, Mill Road, Woodland Road area into the north area.

Mr. Robert Wilson: Myself, as a voter, I could not buy any one of their projects. There are a lot of people that have lived for a lot of years in this area and have settled to year-round homes and now the State could come in and say you have to get out. I would say 'Thank you but No'.

Mr. James Clifford: The main reason we are here is to stop erosion. There is only one small section that breaches the wall with every high tide and that is between 1st and 5th streets. There is no other place it comes over the wall.

Mr. Roland Paige: My only interest is in the Town of Hampton. I think this is the biggest rip-off that we have ever had presented to us. I would like to take exception to what has been said here tonight. The Corp of Engineers will not come in unless there is political pressure. They have been known to do some dastardly things but they do not go out looking for work. If you want to see the Town of Hampton cut up into little junks, vote for this. But, from the people here tonight, anyone that thinks they can is crazier than I think they are. For years they have told the Town of Hampton that they would not do a thing to Boars Head because it was private property. I think we have to defeat this thing and tell the Corp to go back to Washington.

Mr. Wilfred Cunningham: I have lived here for over fifty years and have raised my kids here. It is very obvious that someone is neglecting to do the, is neglecting to take the opposite approach and say 'what happens if they do nothing?' If they do nothing, you will have no North Beach. Our efforts or our comments to the Corp should be to find some way to make that wall a permanent barrier. The State also has a good chunk of property in that highway. I think we should ask the State what they are going to do. They should come up with some program. If this is the first plan, they better start doing something because we can't wait too much longer.

Mr. Fallon: I hope that helps everyone to focus in on the situation. Apparently the alternative is that nothing is done. The first plan might be possible to be done which would protect but there would be no beach.

July 19, 1976

Mr. James Fallon, Chairman  
Board of Selectmen  
Town of Hampton, New Hampshire

Re: Erosion Control Hearing  
July 21, 1976

Dear Mr. Fallon and Board Members:

A business trip to New York prevents me from attending the scheduled hearing, but I wish to present two cautions for your consideration.

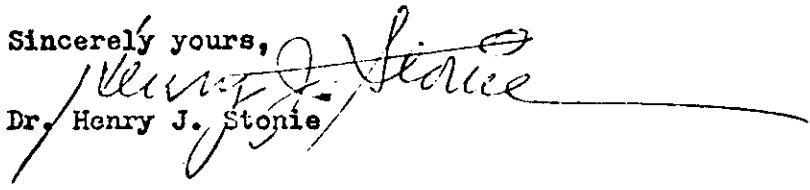
As a resident and taxpayer of three leased lots on Ocean Boulevard, North, I am well aware of erosion problems on our part of the beach having spent many thousands of dollars on rip-rack to control high waters.

Any proposed projects in the North Beach section should contain preliminary studies of possible effects on the Plaice Cove - North section.

A second consideration is the increased commercialization of the district. We are well aware of the problems that an itinerant milieu promotes. The Board is obligated to prevent any extension of the Salisbury and Revere Beach syndrome.

Thanking you for attention to these concerns, I am,

Sincerely yours,

  
Dr. Henry J. Stonie

346 Ocean Boulevard, North  
Hampton, New Hampshire

HJS/s

Appendix B

Mr. Carl Margeson: It is my understanding that the Federal government controls all of the seacoast to the existing high water mark. My point is this: I am in favor of the federal government doing anything in their power to prevent erosion and leaving it there alone and doing nothing to the west of it. I am not in favor of the residents of who knows where getting their fingers into it. I understand that this is a 7.7 million dollar project.

Mrs. Woodman: That is the cost projected for the construction of the revetment alone. The Federal government has stated they will go in for one-half. If all that is constructed is the revetment, that would effectively terminate the use of the beach. There are not very many politicians who will propose putting up money to do this. The other one-half would be hard to come by. The Corp is very realistic in that the State owns the beach. The State collects parking fees. The State has no interest in seeing what funds they do get go into a project such as this. That is the reason we were not given costs. They have given the costs on the alternative plans. The cost is based on where the sand will come from. It varies from \$3.20 to \$8.28 per cubic yard depending where you get the sand from. Based on the acquisition of sand from the ocean that would be dredged and barged in, the first cost plan varied from 2½ million to 8 million with a lot of refinement, annual operating cost, cost benefit ratio, etc. It calls for such extensive study that there is no reason to pursue this if it is not necessary. I would like to reiterate that the Corp is aware of very serious erosion in the North Beach area. The granite revetment could be built because it would not require a new roadway or parking area but we would have to find someone to put up the other one-half.

Mr. Carl Margeson: If the government wants to come in at Federal expense period, I am all for that. But, anything else, parking area, roadway, etc. where we the people in the Town of Hampton are going to be responsible for, I am not for this. I think this will either be Federal or State parking. This is what it will amount to. The statement has been made that the State owns the Boulevard. Why is the Town of Hampton paying police officers to walk up and down that beach?

Mr. Fallon: Just a reminder. We do have a rule of No Smoking during public meetings. The west side of the Boulevard is one area that has a lot of history. We have tried over a number of years to reduce the town's participation but I do not have the particulars.

Mr. Carl Margeson: I will tell you how the traffic will go. It will be off the Expressway, down Landing Road and down Winnacunnet. I live right at the corner of Winnacunnet Road and Landing Road. Any more traffic I do not need. I am for the government coming in and taking care of the erosion at their own expense but leave the road and all that other jazz, leave it alone.

Mr. Fallon: So far as I understand, we have not gotten an offer like that; that they will pay for it all.

**Mrs. Woodman:** Many years ago when the Expressway was being designed, the original proposal was to go across and come down somewhere in the vicinity of North Beach and North Shore roads. It did not hit one square yard of salt marsh. But it has certain disadvantages because this way you would be putting the traffic into a narrow road, high density area, like that in the main beach area, and leave it to filter out itself. There was a proposal for an extension of the Expressway skirting Eel Ditch and that did not seem to be a popular plan. The Planning Board has been considering for the past year and a half to two years to have substantial off-beach parking facilities, and be assured that there are federal funds for a project of this type, where people park their cars off Hampton Beach and get on a public facility and get deposited on the beach and still be assured that they can get back to their cars within a relatively short period. This would relieve totally the pressure of parking. If this new beach ever came into being, this would probably be the most feasible plan.

**Mr. Peter Meneghin:** I would like to direct my remarks towards this information sheet. Proposal #4 suffers from a very poor description in the handout. It assumes that it would result in destruction of the beach as we have it. The width of the revetment would be 12½ feet and at high tide the beach is not much wider. If you contrast what might be accomplished without the attendant extra sand, the attendant parking, this may be the plan to stop erosion. I would also like to comment that the Corp can come in without the approval of the Town but the Corp wants a substantial commitment from the State and the Town. I think what is really anticipated is that there might be some matching or in-kind funds. If the residents indicate that they have no desire for either of these proposals, the Corp would find other things to do elsewhere.

**Mr. William Barkley:** I remember when the present seawall was built. Does this revetment extend in front of the concrete wall as far as the railing? It would appear that the group, that the entire assembly has had a good presentation. I think it is the Board's prerogative to ask for a show of hands to see if the group is in favor of taking business away from Hampton Beach and building a new Hampton Beach in the North Beach residential area or leaving it as it is now.

**Mr. Fallon:** I am inclined to think that it would be helpful to ask for a show of hands. It would be very important to frame the question carefully. It will also be possible for people to file written comments at the town office until August 2nd on this subject. Before going any further, I would like to read a letter that was given to me by Reverend Stonie (letter read).

**Ms. Debra Kerwin:** What I wanted to say is a matter about the Corp that I am quite concerned about. They have done several things that we have known to damage property. I don't trust the Army Corp of Engineers and if they insist there is erosion or that much erosion, let them do the least that would damage the beach. My feeling is that I don't want them around.

**Mr. Fallon:** Let me see if the members of the Board would like to ask for a show of hands. Do the members want to ask

for a show of hands on some of the alternatives? I will ask the members if they see it as a matter of three alternatives they want comment on: 1) If the Town wants nothing done; 2) Some erosion control done recognizing the cost involved to us and the State and leaving the beach area without any sand; or 3) Do we want them to provide a beach with the understanding that we and the State will have to provide certain facilities and generally change the character of the beach from what it is today.

Mrs. Woodman: The Corp made what is termed a very preliminary study and I will read to you from Plan #4 and will ask those people who are very familiar with that area say at half-tide to make the determination of whether there will be any beach left. "This plan involves the placement of rock revetment along the entire 7800 feet on the study area at the base of the steel sheet pile and concrete wall. This revetment will have a top width of 12.5 feet and a seaward slope of 1.5 feet horizontal to 1.0 vertical..." They are talking about 16 feet above mean high water. I believe that would take up the major portion of useable beach at half tide. In some areas there is more beach than that.

Mrs. Hayden: I have been a resident of Hampton since 1905 and a legal year-round resident since 1930. I swam on Hampton Beach between those years and it was a good beach. What ruined it was all that riprap that was put in by whoever. The breakwater that was put in the north beach area is one of the most effective breakwaters ever built. Historically this is a far reaching project. I wish to compliment everyone of you that have come here tonight. For years we have had a sandy beach and then the State took over; they took over the whole shore of Hampton in the 1930's and at that time the State agreed to maintain the beach. As you people know who live in that area, very little has been done to maintain the beach. As often happens, some people who were concerned with the lack of beach facilities evidently contacted their Congressmen. I don't know who but that is evident. And what has followed is very typical of what often happens in government. Instead of taking the situation in hand and coming up with the most simplest plan, they have come up with a grandiose multi-million dollar project. I think the Planning Board and the Board of Selectmen were told a figure of as much as \$380,000 as a maintenance figure. There was also a figure about increased revenues and I want to know to whom--the State, to businesses or to the people. If the State agreed to maintain the beach, then I think the thing to be done is for the State to maintain it. I am a little afraid of our voting to do away with the beach but I am also equally certain that residents would like to see better maintenance of same and I believe it would be worth their while to bring greater pressure to bear on the State and to look up the former agreement and see if they are living up to it.

Mr. Norton: I agree with Mrs. Hayden that it is the responsibility of the State of New Hampshire. Where we have three proposals for a show of hands, I would like to add another one and make it four proposals. Proposal #4 would be that the State of New Hampshire put the beach back in the condition that it was in 1934. In 1933 the Town of Hampton gave the beach to the State. The agreement was that the State would take over maintenance of the beach, maintain

the river, maintain the seawall and the highway. That is the way it should be. The State should come in and put it back the way it was then. If the groins were rebuilt that would hold the sand back out so that the waves would break out about 75 feet. That I think is the proposal we should do. That would give us our beach back and we would have erosion control.

Mr. Fallon: Does this audience wish to advise the State of New Hampshire that we think they should put the beach back in the condition it was in 1934? It appears to be a unanimous vote. For the record there appeared to be one person with their hand raised for proposal #1 (Erosion Control with no guarantee of a beach) and two hands raised on proposal #2 (keeping the proposal involving erosion control and a larger beach with the understanding that the Town and State would have to provide additional facilities).

Mr. John Borghardt, 46 Kings Highway: I have come here to Hampton Beach for 46 years for vacation time. I fall in love with this place and I met my wife here and I bought this place and this is a beautiful piece of property. I remember when there was no seawall; there was rocks and you walked up on them and we had a beautiful beach then. There is a lot of people here who own property at Hampton Beach here tonight but this is not the point. There used to be rocks that blocked the water. We have fewer miles of beach compared to other states. They put down corrugated metal and now it is all broken. I want to know who is supposed to fix it. I fell and almost broke my leg.

Mr. Fallon: In answer to your question, the State is responsible for repairing it.

Mr. John Borghardt: How come they fix it on Boars Head and not fix it on 1st Street?

Mr. Fallon: The town government is not responsible ...

Mr. John Borghardt: I just wanted an answer as to who is going to fix it?

Mr. Fallon: I was trying to explain that all that is the responsibility of the State of New Hampshire.

Mr. John Borghardt: I also want to comment that it should be explained more precisely where the highway is going to go. And about the sand; I see it being pumped out from the bay and bringing it back to the beach and dumping it and the waves coming in and taking it back out again. The tide comes in and undermines it and brings it back to the bay. The only way to do that part would be to put in a breakwater to stop the shifting of sand. You will have more beach than you can handle. And it will only cost 1 million and not 7 million. Put in a big new beach and who will come to enjoy it? Certainly not the people from town who live here. And I have to pay for it?

Ms. Polly Weinhold: I have been listening to this proposal and I am in agreement with the majority. I believe we will be getting into the same thing as with the Life Safety Code. The

proposals should be published in the newspapers and explained thoroughly and then have some vote on it. A lot of people who would be affected by this are from out of town. If it was just taxpayers fine but they are only 1/3 of the people involved. If it is going to be defeated, it should be by the majority.

Mr. Fallon: That is what it is. The reason for the show of hands was to advise the Board as to the feelings of the people.

Mr. Lessard: This was in the newspapers before and I do take a little offense to the person who said that we did not prepare ourselves properly. The Selectmen will not vote on anything without your wishes. As far as the other people coming here, I say Thank God they do come. There are not as many people at Town Meeting as there are here tonight. You only get this many people out for mosquitoes, Life Safety Code and something like this. I say this is the only one place to express their opinion. If we like home rule, this is what we should do. I am glad all of you showed up.

Mr. Kenneth Berrett: I didn't intend to say anything. When this first came to my attention there was notice that they wanted space for 10,000 people for a recreational area. Now a proposal for parking space on Kings Highway is being considered. You are talking about a 15-foot seawall to hold the beach and then about 10,000 people on top of it. People who lease land and own their homes are entitled to the same consideration. As far as the puppy coming out of the kennel, this is the first time I have heard of that. Getting back to dollars and cents, we have a proposal for 7 million. We all know that is not a firm figure. It will probably be 12 million. Divide that by 3 and you will have a 4 million dollar bond that the taxpayers will have to pay. I can't understand why someone from the Corp was not here tonight to explain this. There seems to be over the years a crazy idea that they have to develop the marsh and destroy it and take it from there. I say it is up to the people of Hampton to put this down once and for all.

Mrs. Woodman: What I am going to say is not going to please everyone in this room. Perhaps not while we are alive to see it, but I am as certain as I am standing here that there will be a sandy beach at North Beach within the foreseeable future. We all have children and they will have children. They are entitled to go to the beach and sit on a sandy beach and they have the right to. All you have to do is go out on the highway on a good summer day and see the number of people coming to Hampton Beach. This proposal would develop that kind of sandy beach. It would be a hardship to this town. It would cost a lot of money. It would be an inconvenience to some people. I am so sure that this will happen that I want to see that it is done right. I want to protect the Town so that North Beach will not be like Hampton Beach is today. I want it to be a place where people can go without the pressure of commercial establishments, without beer joints and harassment that keep many people and Hampton residents off the main beach during the busy summer months. North Hampton beach has right now what is the potential for North Beach. Parking is one of the problems. That is why I want all of you to

recognize that this will not happen in this decade but when it is done it should be done in such a way as to protect the people; that things do not occur in North Beach so that it can be developed as a sandy beach where one can go and sit and enjoy the ocean.

Mr. David Mason: It was mentioned that someone might be getting a foothold into the marsh. I think the Public Service Company has already done that. Is Route 1 going to be used as an access road?

Mr. Fallon: I don't think so. There are other routes that would be more direct.

Mr. David Mason: I am questioning whether they are trying to get the Town of Hampton to build a road for them. They are very smart in this way.

Mr. Fallon: I attended a meeting on the nuclear power plant and to my knowledge they did not make any reference to another road like this. It was not put forth as part of their evacuation route.

Mr. David Mason: I am for the erosion project. I hope we are not doing this for the Public Service Company. I hope we are doing this for ourselves.

Mr. Philip McDonough: As Landuse Chairman of the Seacoast Anti Pollution League, I would like to reiterate our concern about the marsh and the proposed road leading from the Expressway straight across the marsh to Boars Head. If that is the case, I think it would be totally out of character with what has been mentioned tonight. Was this something sketched out by the Corp of Engineers?

Mrs. Woodman: Yes, it was part of the original proposal last winter. It's importance was so insignificant I did not use that piece of material after the hearing in Concord. There was general universal agreement that that idea would not have any relation to feasibility of construction in the Town of Hampton.

Mr. Philip McDonough: You are saying this location was originally presented?

Mrs. Woodman: And rejected.

Mr. Philip McDonough: It worries me.

Mrs. Woodman: That is why we are here tonight.

Mr. Philip McDonough: As Louisa Woodman expressed there is need for parking at the beach and has been for some time. Many people have looked at the beach problem but no one has the ideal solution. Public transportation--I would wholeheartedly endorse that idea but make sure that it does not bring with it overcommercialization of another section of the town.

Mr. Kenneth Berrett: Louisa Woodman stated that our children and their children need something fine later on. We all know that. I know from experience that we do not thank our fathers for what they saddled us with. Four million dollars is not pennies. We have fine schools in Hampton but when the kids graduate they have to leave to find employment. I think this town should concentrate on getting employment places like Wheelabrator-Frye. I can not see this development of a new beach, the parking and commercial places. You will end up with one huge traffic jam. They have already had to close Hampton Beach two times this summer because it was overcrowded.

Mr. Fallon: Does anyone know... There has been a motion to adjourn and I wish to thank all of you people who have come tonight.

The public hearing on the Beach Erosion Control Study for North Beach, Hampton, New Hampshire adjourned at 9:30 p.m.

Respectfully submitted,  
Helen G. Ceres, Secretary .



STATE OF NEW HAMPSHIRE  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS  
JOHN O. MORTON BUILDING

JOHN A. CLEMENTS, P.E.  
COMMISSIONER

March 19, 1976

CONCORD, N.H. 03301

Col. John H. Mason  
Department of the Army  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154  
Attention: William T. Coleman

Dear Colonel Mason:

This letter will serve as the Department's comments on the Corps' beach erosion control study at North Beach in the Town of Hampton, New Hampshire. Our preliminary investigations reveal that the proposed action will increase traffic in the area by an estimated 7,500 vehicles per day (VPD). This figure arises from the Corps' estimate of an increase in beach capacity from the present figure of 2,000 persons to an estimated 17,000 if the facility is constructed. Assuming a turn-over twice a day and an average of four people per vehicle this increases the number of vehicles from the present figure of 1,000 VPD to a post construction value of 8,500 VPD. The average daily traffic for 1975 as obtained from two permanent traffic counters located north and south of the project area on New Hampshire Route 1A is:

		Month			
Recording Station		June	July	August	September
North Hampton	Avg. Sunday	8,169	9,961	9,356	5,867
N.H. 1A	Avg. Weekday	4,450	7,243	6,548	2,774
Hampton Harbor	Avg. Sunday	19,265	21,121	19,113	9,554
Neil Underwood Bridge	Avg. Weekday	10,207	15,875	14,077	4,788

These volumes are high, approaching volumes found on Interstate Highways, and during peak hours Levels of Service E and F are reached in the beach area. These Levels are characterized by unstable traffic

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3/19/76

flow with low operating speeds and stop and go conditions. If traffic were increased by expanding beach capacity the already poor conditions would become worse as the E and F Levels would occur more frequently.

There are four State Highways which provide access to the beach; New Hampshire Routes 101-C, 101-D, and 101-E and the Exeter-Hampton Expressway. These highways have the following sufficiency ratings:

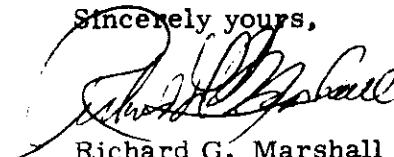
Route	Sufficiency Rating
101-D	54
Exeter Hampton Expressway	
I-95 to U.S. 1	89
U.S. 1 to N.H. 1-A	76
N.H. 1-A	
101-E North 0.38 miles	81
North 0.7 miles to 101-C	69
101-C to 101-D	47

The Department considers a highway with a sufficiency rating of less than 60 to be deficient. No sufficiency ratings are available for Routes 101-C and 101-E. These routes are within the urban compact and are town maintained.

The increased beach capacity would also increase demand for parking facilities. This demand may be difficult to satisfy because of the extensive development in the area and the contiguous marshes. The area is also part of the proposed Coastal Zone Management Area.

These are the Department's observations based on preliminary investigations. A complete detailed systems analysis would be required before any specific alternatives could be proposed to alleviate the problems.

Sincerely yours,



Richard G. Marshall  
Advance Planning Engineer

RGM/em

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# State of New Hampshire

## WATER RESOURCES BOARD

37 Pleasant St.  
CONCORD 03301

February 13, 1976

Colonel John Mason  
Army Corps of Engineers  
New England Division  
424 Trapelo Road  
Waltham, Massachusetts 02154  
Attention: Coastal Development Branch

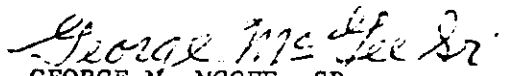
Gentlemen:

This office was recently requested to review the status of Legislation that was brought before the 1971 Session and the 1972 Special Session of the New Hampshire Legislature dealing with "prohibiting the mining of sand and gravel in the inland tidal waters of the state." We have reviewed this matter with the Clerk of the House, the Secretary of State's office, the Chairman of the Resources, Recreation and Development Committee who heard this bill, and the Attorney General's office.

In the 1971 Legislature, House Bill No. 269 regarding this matter was sent to an Interim Study Committee and in the Special Session of 1972, a House Resolution was adopted restricting the mining of sand and gravel to 100,000 cubic yards in the territorial waters of the State of New Hampshire. The Interim Study Committee have not at this time issued a report on the original bill and we have been advised that the resolution is only a consensus of the House, has no affect in law and, therefore, does not restrict the mining of sand and gravel in tidal waters in the State of New Hampshire.

I hope that the above will answer your inquiries regarding this matter.

Respectfully yours,

  
GEORGE M. MCGEE, SR.  
Chairman

GMM/VAK:hb

cc: Rep. Russell G. Claflin  
Wolfeboro, New Hampshire

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NEDPL-C

13 February 1976

Mr. Peter G. Lombardi  
Town Manager  
Hampton, New Hampshire 03842

Dear Mr. Lombardi:

This letter is in response to your telephone conversation of 4 February 1976 with Mr. Coleman of my staff concerning the Corps' beach erosion control study for North Beach in Hampton.

I understand that Mr. Coleman explained to you that our Coastal Development Branch is looking for written feedback from the Selectmen of Hampton in regard to the workshop meeting which was held on 19 December 1975 in Concord, New Hampshire.

Preliminary plans of improvement and protection that have been developed by the Corps for the North Beach area were discussed at the workshop meeting. Also discussed were a number of problem areas and constraints associated with the study such as: parking, road access, location of a suitable sand source at a reasonable price, local plans for developing the North Beach area, and local cost sharing.

We would appreciate it if you would please bring this matter to the attention of the Selectmen and ask them to give us a written response concerning their views of the alternative plans which have been developed and the constraints in the study area. This information is most important and necessary for us to determine how to proceed with the study.

I look forward to receiving a response from the Selectmen of Hampton and wish to thank you for your efforts in this matter.

Sincerely yours,

JOHN H. MASON  
Colonel, Corps of Engineers  
Division Engineer

cc:  
Mr. Arpin  
Reading File  
Planning Div Files

Appendix B



OFFICE OF COMPREHENSIVE PLANNING  
STATE OF NEW HAMPSHIRE  
STATE HOUSE ANNEX, CONCORD 03301

February 6, 1976

Col. John Mason  
Division Engineer  
U.S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Attention: Coastal Development Branch

Dear ~~Colonel~~ Mason: *John*

In response to the request for input in the preliminary "Beach Erosion Control Study for the Shores of the State of New Hampshire at North Beach, Town of Hampton, New Hampshire and Foss Beach, Town of Rye, New Hampshire", December, 1975 the Office of Comprehensive Planning makes the following comments.

David Hartman and Don Oswalt, of this office, reviewed the study and attended the meeting which your office conducted on December 19, 1975 regarding its proposals. Mr. Hartman has reviewed the study emphasizing its relationship with his work on the State's outdoor recreation plan.

It is stated in the Introduction of the study that the reason for the study was a "request of local and state interests concerned with the erosion problems" at the two beaches. As was mentioned several times by many persons in attendance at the December meeting, there probably is and will continue to be erosion problems. It is felt, however, that the problems, or potential problems, if no project is undertaken needs to be documented. This would result in base line data against which a more accurate measurement of the costs and benefits could be made. It would show probable property loss, both publicly and privately owned, due to erosion and inundation. It would include current and projected major public expenses of maintaining the existing seawalls so as to minimize property damage. These elements are measurable in monetary terms and should be considered along with the benefits and costs of related recreation.

Further, consideration must be made of the extent of other provisions of the proposed project at North Beach. Included would be the amount of money and changes of land use needed to provide the necessary parking and road accesses.

The 1975 New Hampshire Outdoor Recreation Plan surveyed local community leaders throughout the State and some of the results are pertinent to the erosion control study. Community leaders felt that, throughout the State, the priority of need for new beach areas was 4th out of 20 possible facility needs. Ranking

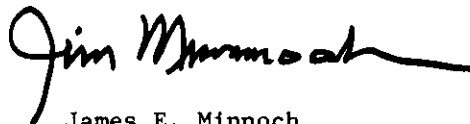
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February 6, 1976

before beaches were tennis courts, ballfields and outdoor ice skating rinks. In contrast the community leaders from the Strafford-Rockingham Region placed the priority of need for new beaches as 9th of 20, significantly lower than the response for the State. The leaders did feel a need but it was less intense for beaches than for many other recreation facilities. Also, the community leaders generally felt that the beaches they did have should serve only the local communities in which they were located. This opinion could be interpreted as opposition to the expansion of this type of beach facility as proposed in the study.

Undoubtedly, there is a need for some new beach areas in the seacoast area, but the degree, the placement and the purpose of these areas must be closely studied. A recent study of the "Economic Impact of Certain Shoreline Users on the New Hampshire Coastal Zone" has been forwarded to your office. The impact study was prepared by the Southeastern New Hampshire Regional Planning Commission and is a quite informative and relevant to the beach erosion study.

Sincerely,

A handwritten signature in black ink, appearing to read "Jim Minnoch", with a long horizontal flourish extending to the right.

James E. Minnoch  
Director of State Planning

JEM:jyb

Appendix B



NEW HAMPSHIRE DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT

GEORGE GILMAN  
COMMISSIONER

January 7, 1976

Colonel John Mason, Division Engineer  
United States Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Attention: Coastal Development Branch

Dear Colonel Mason:

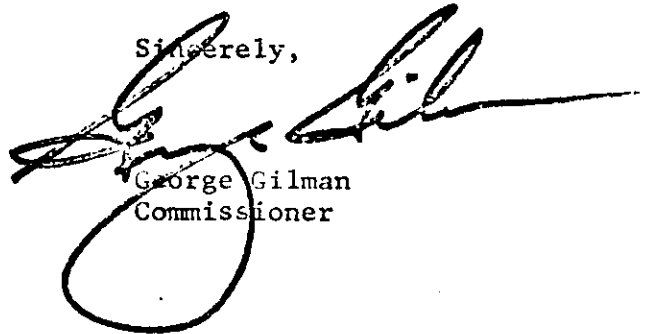
I am responding to the Corps' request for comments about the North Beach proposal at Hampton, New Hampshire as a follow-up to the meeting of December 19 held in Concord, New Hampshire.

It is the view of this Department that it would be desirable to improve North Hampton beach for bathing through beach nourishment, and the addition of structures for added protection from winter storms. However, we do not consider it feasible to undertake this project without the concomitant provision for additional vehicular parking space. At the present time, neither the Town of Hampton nor the State of New Hampshire is in a position to provide additional parking facilities at this location.

Strict federal and state dredge and fill statutes limit the availability of lands which can be converted for parking use. Further study may reveal other options available for additional parking.

Until there is some assurance that there will be sufficient parking space available for additional visitors, which an improved beach would attract, we must qualify our endorsement of the North Beach study recommendations and suggest that the improvement of North Beach be deferred.

Sincerely,



George Gilman  
Commissioner

GG:GTH:c

cc: Mr. Robert Sullivan

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## **Southeastern New Hampshire Regional Planning Commission**

December 29, 1975

Mr. William Coleman  
U.S. Army Corps of Engineers  
Coastal Development Branch  
Beach Erosion Section  
424 Tapelo Road  
Waltham, Massachusetts 02154

Dear Bill:

In response to the Corps request for information pertaining to the Hampton North Beach erosion control study, I have forwarded under separate cover the following documents:

- 1) Hampton Beach - Recommendations for Action
- 2) Soil Survey of New Hampshire Tidal Marshes
- 3) Marine Mining of Sand and Gravel in the New Hampshire Coastal Zone (plus map)
- 4) Southeastern New Hampshire Regional Planning Commission Reports
  - #3 Existing Land Use
  - #5 Future Land Use Plans
  - #6 Water Supply
  - #10 Open Space and Recreation

Information on regional transportation systems is contained in volumes 3 and 5 of the SENHRPC reports. Data on onshore sand and gravel deposits may be found in volume 6 of the series.

Beach users have been inventoried for Hampton Beach only in late July and early August, 1972. Flights covering the entire coast were made on various days in July of 1974 and July of 1975. Slides covering all of these dates are available in our office.

Data on sand and gravel deposits off the coast of New Hampshire is available both here and at the University of New Hampshire. For UNH data, I suggest you contact Professor R.W. Correll, Kingsbury Hall, Durham, N.H. He has been in charge of a research project analyzing sand and gravel deposits off the N.H. coast. The data here is scattered and relies on seismic survey lines from the Corps' sand inventory

**3 Water Street Exeter, New Hampshire - Tel. 603-772-6913**

Appendix B

Mr. William Coleman  
U.S. Army Corps of Engineers  
December 29, 1975

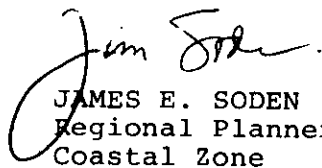
2.

program, data from the USGS continental margin program, and a number of other sources. It would be best for you to look through it yourselves. We have some grain size analyses, but not many.

The one area of your presentation which I have some reservations about is the cost data for onshore vs. offshore sources of aggregate. I would be interested in obtaining from you the derivation of the two alternative figures.

I hope the information I've enclosed is of use to you. Feel free to contact me if you have any further questions.

Sincerely yours,

  
JAMES E. SODEN  
Regional Planner  
Coastal Zone

JES: lc

15 December 1975

Mr. Robert H. Whitaker, Commissioner  
N.H. Dept. of Public Works & Highways  
John O. Morton State Office Building  
Concord, N.H. 03301

SEE ATTACHED LIST FOR  
ADDITIONAL ADDRESSEES

Dear Mr. Whitaker:

The New England Division, Corps of Engineers is conducting a beach erosion control study for the shores of the State of New Hampshire at North Beach, Town of Hampton and Foss Beach Town of Rye. This study was authorized by resolution of the United States Senate and House Committees on Public Works adopted 8 December 1969 and 2 December 1970, respectively. The purpose of the study is to determine the economic, environmental and technical feasibility of providing shore protection and improvement measures for these two areas.

Preliminary alternative plans of protection have been developed, including an economic evaluation, for the North Beach area. No plans of protection have been developed for Foss Beach due to the economic and environmental constraints in the area.

A workshop meeting is scheduled to be held on 19 December 1975 at 10:00 A.M. in Concord, New Hampshire at the Forestry Warehouse Conference Room located at 5 Langdon Street. The purpose of the meeting is to discuss the findings of the study to date with Federal, State and local officials and to obtain their views, desires and comments at and subsequent to the meeting. This response in turn will be reflected in the presentation at a public meeting scheduled to be held in early 1976, should certain items be resolved. A copy of the information, which will be passed out and discussed at the meeting, is inclosed. It is hoped that you will have a chance to look over this information prior to the meeting so that you will be better able to provide comments and input to the meeting.

NEDPL-C

15 December 1975

Mr. Robert H. Whitaker, Commissioner

You and any other members of your staff or agency are cordially invited to attend the meeting. My staff members are looking forward to seeing you at the meeting.

Sincerely yours,

1 Incl  
as stated

JOHN H. MASON  
Colonel, Corps of Engineers  
Division Engineer

cf: Mr. Arpin  
Planning Div Files

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MAILING LIST

Mr. Robert H. Whitaker, Commissioner  
N.H. Dept. of Public Works & Highways  
John O. Morton State Office Building  
Concord, N.H. 03301

Mr. George Gilman, Commissioner  
N.H. Dept. of Resources & Economic Development  
State House Annex  
Concord, N.H. 03301

Mr. James Minnoch, Planning Director  
Office of State Planning  
State House Annex  
Concord, N.H. 03301

Mr. Bernard W. Corson, Director  
N.H. Dept. of Fish and Game  
34 Bridge Street  
Concord, N.H. 03301

Mr. Charles Tucker, Executive Director  
Southeastern N.H. Regional Planning Commission  
3 Water Street  
Exeter, N.H. 03833

Mr. Mel Evans, Supervisor  
Concord Area Office  
U.S. Fish and Wildlife Service  
Federal Building, 55 Pleasant St.  
Concord, N.H. 03301

Mr. Peter G. Lombardi  
Town Manager  
Town Hall  
Hampton, N.H.

Mr. Robert E. Goss  
Board of Selectmen  
Town Hall  
Rye, N.H. 03870



STATE OF NEW HAMPSHIRE  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS  
JOHN O. MORTON BUILDING CONCORD, N.H. 03301

ROBERT H. WHITAKER  
COMMISSIONER

July 5, 1972

Colonel Frank P. Bane  
Division Engineer  
New England Division  
Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Colonel Bane:

This Department supports the beach erosion control study of the New Hampshire shoreline at North Beach in Hampton and Foss Beach in Rye as outlined at the public meeting on June 22, 1972 at the Rye Town Hall.

Erosion and seawall damage and displacement by wave action in the proposed study areas has created hazardous travel conditions on Ocean Boulevard, caused road closures for extended periods of time, threatened and endangered sections of the highway and adjoining private property and caused heavy damage to pavement and shoulders. In addition, the loss of sand from the beach areas has been substantial and thereby reducing the popularity of the beaches. A brief description of difficulties at each location is indicated below.

North Beach

The steel sheet piling wall between Great Boar's Head and the concrete seawall to the north has sustained heavy pounding since its construction. One particular section in the vicinity of 2nd Street has weakened to the point that heavy rip rap revetment had to be placed on the ocean side to prevent further damage. Sand loss and displacement of groins has occurred rendering beach not so desirable due to the cobbly shale beach. This particular section of Route 1-A is also subject to frequent closure during periods of high seas. Northbound traffic is normally rerouted in the southbound lane during these occasions.

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7/5/72

Foss Beach

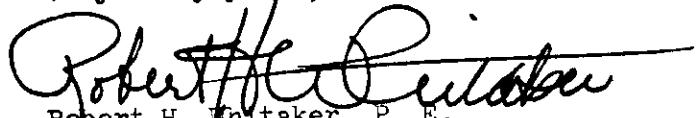
The natural shale pile from Ragged Neck northerly is badly affected in all storms, even of lighter intensity, depositing shale and debris on the pavement and eroding highway shoulders and pavement, rendering unsafe travel conditions and occasionally blocking the road. Heavy annual maintenance for repairs, restoration and cleanup are required. The storm of February 19 and 20, 1972 flattened the shale pile with substantial loss of material and considerable damage to private homes.

One item of concern is the requirement for parking and bathing facilities in connection with beach improvements. For safety reasons it is requested that any parking facilities be so designed that vehicles are prevented from backing directly onto the highway travel lanes.

In addition to the highway travel requirements in these two critical areas, it is recommended that the study weigh carefully the recreational needs, as well. New Hampshire's population projections indicate that its number of residents will double in approximately fifty years; this, coupled with the ever-growing number of visitors each year, will require that the optimum potential of these beaches be realized if the recreational needs of our citizens are to be satisfied. It is recommended that the feasibility of renourishing these public beaches lost through erosion be studied, including protective measures, such as groins, to preserve any improvements that are made. Any replacement or modification of existing seawalls and revetments should include provisions for full public access to the beaches. Of equal importance, of course, will be the necessity of supporting facilities, such as public rest rooms, bathhouses and supplemental parking areas.

This Department and members of the staff will cooperate and be available to provide additional supporting data.

Very truly yours,

  
Robert H. Whitaker, P. E.

RHW:cc

c.c. George T. Gilman, Commissioner  
Dept. of Resources & Economic Development

# CONSERVATION COMMISSION

OF

RYE, NEW HAMPSHIRE

June 30, 1972.

Army Engineers  
424 Trapelo Road  
Waltham, N.H. 02154

Regarding: Foss Beach, Rye, N.H.

The hearing held in Rye on June 20th enabled a better perspective on your study of this area. I will offer a few points on the area.

Foss Beach is of moderate condition and receives moderate use. When the term "erosion" is used, it leads to the impression that the condition of the beach itself has deteriorated. Actually the beach has changed very little, according to persons who know the area well. It is man that has made the intrusion. The row of cottages and business establishments were for the most part built before there was a concern for saltmarsh protection. Engineering for adequate sewerage disposal has changed in recent years, as has engineering on how to build more solidly in a storm-exposed area. Despite the problems of some of the present structures, their valuation is high, as pointed out by selectman, Bob Goss.

The real problem then is not so much the wearing away of the natural beach, as it is the problem of protecting existing private property, and protecting the state highway, Route 1-A.

The present and potential public use at Foss Beach is quite different from the public use at North Beach, Hampton. At Rye there is no general promotion for greater public use. There are some beach rentals in the Foss Beach area, but limited in extent and development potential. The only expansion space available would be the saltmarsh for additional rental units, for plumbing facilities for the public, or for additional parking.

One of the severe problems in expanding public use at Foss Beach is the bottleneck status of Route 1-A, and all roads in Rye connecting with it. (This traffic problem can be observed any Sunday in July with fine weather.) All of these routes are slow scenic routes which would not adapt to much increase in traffic over what they carry now. Rye has so much saltmarsh and swamp acreage, that there is no alternate road routing available. Along the Rye shore, therefore, we feel that it is sound planning to discourage plans for substantial expansion of public use.

We see no problem with limited public use, controlled by a limited degree of public parking beside Foss Beach. Development for heavy public use would change the character of this area, and would add pressure to the already overcrowded Route 1-A.

The placing of massive rock chunks could protect highway and houses. Your assistance in planning will be appreciated. If plumbing and parking have to be tied into your assistance in the project, then it may prove best as a project of State and Town.

Sincerely yours,

P.O. Box 364  
Rye Beach, N.H.

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*Louise H. Tallman*  
Louise H. Tallman, Chairman



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
Division of River Basin Studies  
55 Pleasant Street  
Concord, New Hampshire 03301

June 20, 1972

Division Engineer  
New England Division  
U. S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Sir:

Enclosed is an informal draft report on your beach erosion control project for North and Foss Beaches, New Hampshire. When we have received your comments and suggestions, we will make the appropriate revisions and forward the report to our Regional Office for formal review process.

May we have your comments by July 5, 1972, please.

Sincerely,

Norrel F. Wallace  
Supervisor  
Concord Area Office

Enclosure

Appendix B

DRAFT OF JUNE 20, 1972

Division Engineer  
New England Division  
U. S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Sir:

This is our preliminary report concerning beach erosion control for North Beach, Hampton, and Foss Beach, Rye, Rockingham County, New Hampshire. The study is being made under authority of a December 8, 1969, resolution by the Senate Committee on Public Works, and a December 2, 1970, resolution by the House Committee on Public Works. Our report was prepared under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inc.), in cooperation with the New Hampshire Fish and Game Department and the National Marine Fisheries Service. (Comments to be inserted.)

North Beach is adjacent to and separated from Hampton Beach by Great Boars Head, and extends for about 7,800 feet north of Great Boars Head to the location of the former Coast Guard Station. Foss Beach is immediately north of and adjacent to Rye Harbor, and is approximately 4,000 feet long. Both beaches front State Route 1A, and are State owned.

Both beaches have been exposed to frequent easterly storms which have caused substantial erosion and damage to backshore structures and the adjoining highway. North Beach has either sheet steel pile bulkheading or concrete walls along the entire backshore to protect the highway from storm damage. Stone groin structures constructed of granite blocks are spaced along the beach, and have been damaged by wave action. Sand, rock, and other debris have been deposited on the beach and highway, hampering recreational use and causing maintenance problems for the State.

Appendix B

Foss Beach has no major backshore structures or groins, and storm driven waves have deposited large amounts of gravel and rock on the beach and highway. At the present time there is a cobble stone dike extending along the backshore and fronting the highway, formed by natural wave processes and clean-up operations by the State.

We understand your study will consider beach widening for both beach areas by direct placement of suitable sandfill to furnish a protective device and a recreational beach improvement. Consideration will also be given to the need for groin structures to prevent natural loss of sand by wave action and currents.

The short length of New Hampshire beaches are an integral part of the marine ecosystem, and support fishery, wildlife, and recreational resources in a disproportionate amount to their size. Both North and Foss are shallow beaches, with the bottom gently sloping away from shore, and a depth of 20 feet not being reached until approximately 2,000 feet from shore. North Beach is characterized by a broad expanse of sand and mud, while Foss Beach is less sandy and more rocky.

North Beach is one of the major winter feeding grounds for waterfowl and shorebirds along the New Hampshire coast. The sand and mud substrate provide excellent habitat for the benthic invertebrates that make up the major portion of their diet. Several species of groundfish, such as the flounder and halibut, utilize North Beach as a juvenile nursery area. Forage fish attract the striped bass, which frequents the area.

Foss Beach's rocky bottom provides excellent habitat for the lobster, and an important commercial fishery occurs quite close to shore. There is also a

small amount of lobster habitat at the northern end of North Beach.

Removal of gravel and rock washed against the backshore structures should have no detrimental effects on fishery resources, provided a suitable method of disposal is implemented. Conservation should be given to utilizing the material in road maintenance or construction.

Direct placement of sand on the beaches could be especially detrimental to lobster and waterfowl habitat if these areas become covered by slumped or drifting sand. The natural sand transport, which is in a southerly direction, would be expected to accomplish the same thing, but at a much slower rate and with less detrimental effects on bottom dwelling organisms.

It is our understanding that both land and offshore areas will be evaluated as potential borrow areas for sandfill. In general, we feel that sand and gravel dredging in offshore areas is more detrimental to the environment than utilizing land sources. Proposed borrow sites should be carefully evaluated to determine the impact on fish and wildlife resources before dredging is accomplished.

The construction of groin structures may have an impact on marine resources by changing natural sand transport patterns. However, properly placed groins, perhaps at the south end of both beaches, may slow down the natural rate of sand loss, and obviate the need for future extensive beach replenishment.

To assure the development of a project plan compatible with the environment, the following investigations will be undertaken by this Bureau in coordination with the New Hampshire Fish and Game Department and the National Marine Fisheries Service.

1. Determine the location, extent and value of shellfish, finfish and

waterfowl resources in the project area.

2. Determine the effect of sandfill placement on finfish, shellfish, and waterfowl in the project area.
3. Determine the environmental impact of the proposed sandfill borrow areas.
4. Investigate the hydrological changes to be expected as a result of the construction of groin structures, and their effect on shellfish and finfish resources in the area.

Proposed amounts of sandfill replacement, location of borrow areas, locations and types of groins, and other similar engineering details will be needed to undertake the aforementioned studies. We plan to work in close coordination with you and the cooperating natural resource agencies as your study progresses, and our findings will be presented in a conservation and development report.

Please keep us advised of the progress of your study.

Sincerely,

# CONSERVATION COMMISSION

of

Hampton, New Hampshire

June 9, 1972

Col. Frank P. Bane  
Division Engineer of Corps of Engineers  
424 Trapelo Road  
Waltham, Mass. 02154

Dear Col. Bane:

Please enter the following statement in the records of the June 22 hearing in Rye, N. H. on Beach Erosion Control:

"The Hampton Conservation Commission at its June 8, 1972 meeting voted: that we realize the need for beach erosion control immediately in certain areas of Hampton's North Beach northward to the North Hampton boundary. The Commission urges that plans be worked out from a positive environmental viewpoint and requests that further public hearings be held in Rye (or Hampton), when definite plans are available.

We urge consideration of the replacement of the north wall of the U.S. Coast Guard Station land, presently owned by the Town of Hampton, N. H. and abutting Ruth G. Stimson Seashore Park. The Commission opposes disruption of the ecology of the intertidal zone along North Beach and in particular the rocky areas immediately south of Plaisance Cove (off Seashore Park and the U.S. Coast Guard Station area)."

Yours truly,

Peter Randall, Chairman  
Nelson Grant  
Stillman Hobbs  
Ruth Kutter  
Irene Palmer  
Edna Pearl Parr  
Ruth G. Stimson

Appendix B

GEORGE H. FALLON, MD., CHAIRMAN

JOHN A. BLATNIK, MINN.  
ROBERT E. JONES, ALA.  
JOHN C. KLUCZYNSKI, ILL.  
JIN WRIGHT, TEX.  
KENNETH J. GRAY, ILL.  
FRANK M. CLARK, PA.  
ED EDMONDSON, OKLA.  
HAROLD T. JOHNSON, CALIF.  
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DAVID M. HENDERSON, N.C.  
ARNOLD OLSEN, MONT.  
RAY ROBERTS, TEX.  
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GLENN M. ANDERSON, CALIF.  
PATRICK T. CAFFERY, LA.  
DAVID R. OBEY, WIS.

WILLIAM C. CRAMER, FLA.  
WILLIAM H. MARSHA, OHIO  
JAMES R. GROVER, JR., N.Y.  
JAMES C. CLEVELAND, N.H.  
DON H. CLAUSEN, CALIF.  
ROBERT C. MCEWEN, N.Y.  
JOHN J. DUNCAN, TENN.  
FRED SCHWENGEL, IOWA  
HENRY C. SCHADEBERG, WIS.  
M. G. (GENE) SNYDER, KY.  
ROBERT V. DENNEY, NEBR.  
ROBERT H. ZION, IND.  
JACK M. McDONALD, MICH.  
JOHN PAUL HAMMERSCHMIDT, ARK.  
CLARENCE E. MILLER, OHIO

RICHARD J. SULLIVAN, CHIEF COUNSEL  
LLOYD A. RIVARD, ENGINEER-CONSULTANT  
LESTER EDELMAN, COUNSEL  
CLIFTON W. ENFIELD, MINORITY COUNSEL

Committee on Public Works

Congress of the United States

House of Representatives

Room 2165, Rayburn House Office Building

Washington, D.C. 20515

TELEPHONE: AREA CODE 202, 225-4472

2 December 1970

Chief of Engineers  
Department of the Army  
Washington, D.C. 20315

Dear Sir:

Enclosed is a resolution adopted by the Committee  
on Public Works directing the Corps of Engineers to  
proceed with a review investigation of

(See attached list)

Sincerely yours,

*George H. Fallon*

George H. Fallon, M.C.  
Chairman

Appendix B

COMMITTEE ON PUBLIC WORKS  
HOUSE OF REPRESENTATIVES, U.S.  
WASHINGTON, D.C.

R E S O L U T I O N

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Resolved by the Committee on Public Works of the House of Representatives, United States, that, in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army is hereby requested to direct the Chief of Engineers, to make a survey of the Shores of the State of New Hampshire, at North Beach in the Town of Hampton, and at Foss Beach in the Town of Rye, and such adjacent shores as may be necessary in the interest of beach erosion control, hurricane protection, and related purposes.

Adopted December 2, 1970

Attest: \_\_\_\_\_

(Requested by: Hon. James Cleveland)

*George A. Fallon*

Appendix B

SEN. ARNOLD M. YOUNG, OHIO  
SEN. EDWARD S. MUSKIE, MAINE  
SEN. EVERETT JORDAN, N.C.  
SEN. BIRCH BAYNE, IND.  
SEN. JOSEPH M. MONTOYA, N. MEX.  
SEN. WILLIAM B. SPONG, JR., VA.  
SEN. THOMAS F. EAGLETON, MO.  
SEN. GRAVEL, ALASKA

SEN. JOHN THERMAN CO., KY.  
SEN. J. CALDER BOGGS, DEL.  
SEN. HOWARD M. BAKER, JR., TENN.  
SEN. ROBERT J. DOLE, KANS.  
SEN. EDWARD J. GURNEY, FLA.  
SEN. ROBERT W. PACKWOOD, OREG.

RICHARD B. ROYCE, CHIEF CLERK AND STAFF DIRECTOR  
J. B. HUYETT, JR., ASSISTANT CHIEF CLERK  
M. BARRY MEYER, COUNSEL

## United States Senate

COMMITTEE ON PUBLIC WORKS  
WASHINGTON, D.C. 20510

December 8, 1969

Chief of Engineers  
Office, Chief of Engineers  
Department of the Army  
Washington, D. C.

My dear Sir:

Enclosed are original and four copies of a resolution adopted by the Committee on Public Works, requesting the Secretary of the Army to cause to be made under the direction of the Chief of Engineers a survey of the shores of the State of New Hampshire, at North Beach in the Town of Hampton, and at Peas Beach in the Town of Rye, and such adjacent shores as may be necessary in the interest of beach erosion control, hurricane protection, and related purposes.

I am authorized and directed by the Committee on Public Works to transmit this resolution to you for appropriate action thereon.

Truly,

  
JENNINGS RANDOLPH  
Chairman

Enclosures

VAN/db

Appendix B

*Inc 61*

# United States Senate

COMMITTEE ON PUBLIC WORKS

## COMMITTEE RESOLUTION

RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE,

That in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army be, and is hereby requested to cause to be made under the direction of the Chief of Engineers, a survey of the Shores of the State of New Hampshire, at North Beach in the Town of Hampton, and at Foss Beach in the Town of Eye, and such adjacent shores as may be necessary in the interest of beach erosion control, hurricane protection, and related purposes.

Adopted: December 8, 1969

50-975-1

  
JENNINGS RANDOLPH Chairman.

(At the request of Senators Thomas J. McIntyre and Norris Cotton of New Hampshire.)

Appendix B



## **Southeastern New Hampshire Regional Planning Commission**

October 18, 1977

Mr. Joseph L. Ignazio  
Chief, Planning Director  
Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Mr. Ignazio,

I would first express our appreciation to the Corps for extending the deadline for comments on the Beach Erosion Control Report for North Beach, Town of Hampton and Foss Beach, Town of Rye, New Hampshire to 8 November 77.

We have reviewed the report and I have discussed its conclusions with Mr. William Coleman of your office.

The Southeastern N.H. Regional Planning Commission passed the following resolution, by vote, at our October 13, 1977 meeting:

"To urge that the conclusions of the Corps report be rewritten to explain what will happen if NO action is taken at North Beach, in Hampton, and to suggest the minimum maintenance program that will be necessary to maintain the seawall."

We do not disagree with your conclusions as far as you have gone. We do contend that this report will serve as the basic reference document for North Beach and, that a citizen reading it may well conclude that everything is fine as is.

We at the office are not engineers, but it seems obvious to us that the steel seawall is being more exposed and further undermined each year, as well as suffering deterioration from rust.

Your estimate of how long it will last - 5 years or 50, and of measures the town or state could take independent of Corps funding, would be of tremendous importance in convincing the Town of Hampton and/or state legislature to appropriate funds before a wash-out occurs (if one is in the offing).

Only the Corps has done the detailed study of the beach necessary to come to the appropriate conclusions, and, from my conversation with

**3 Water Street - Exeter, New Hampshire - Tel. 603 778-0586**

Appendix E

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Rev 6 Jan 78

with Mr. Coleman. I would guess that you have recommendations for it.

Sincerely,

C. F. T. L.

Charles F. Tucker, Director

CFT/nmp

Copies to:

Governor Thomson  
Senator McIntyre  
Senator Durkin  
Congressman D'Amours  
George Gilman, DRED  
Robert Clements, N.H. D.P.W. & H.  
Peter Lombardi, Hampton Town Manager  
Donald Suprenant, Hampton Planning Board  
Donna La Montagne, Hampton Beach Precinct